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The University of Alberta

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of the*

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The Faculty of Education of the University of Alberta inaugurated in 1977 a Lecture Series Award as one means of encouraging, supporting and publicizing educational research. The recipient of this award will be granted a six-month research leave commencing July 1, 1978. During this time the award holder will be expected to engage in the pursuit of his/her research activities and, as well, prepare a three part lecture series which will be presented in January 1979. At least one of these lectures will deal explicitly with the significance of the research for teaching and/or teacher preparation.

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new from Manchester

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T. V. HODAPP

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Children's Ability to Learn Problem-Solving Strategies from Television

A study was undertaken to determine whether young children can learn problem-solving strategies from educational television segments. Fifty-two 5.5 to 6.5 year old children were shown a segment illustrating a problem and its solution. Thirty-seven children of the same age were shown a control segment. Their eye movements were monitored as they viewed the segments to determine if they extracted relevant information from the segment. They were then asked to perform an identical or a transfer problem task. Results indicated that young children could imitate, but not learn and transfer problem-solving strategies from media to real life. Those who did not solve the problem task did not comprehend the TV segment in terms of a problem and its solution. (Dr. Hodapp is a Senior Research Officer at ACCESS Alberta, Edmonton.)

Educational television stations and production corporations have begun developing programs which instruct young children in such skills as problem-solving strategies on the assumption that young children can abstract complex conceptual principles from media presentations. Studies have indicated that young children can solve simple problems by using strategies (Scott, 1973). However, opinions differ regarding the ability of young children to learn problem-solving strategies from media presentations and transfer them to real-world situations.

Piaget (1970) states that the transductive nature of young children's thought precludes skill learning from media. Olson and Bruner (1974) state that conceptual skills can only be acquired through repetition coupled with feedback from an expert.

Salomon (1972), on the other hand, states that cognitive processes can be replaced, or supplanted, by representations via media of more appropriate or higher order processes. Supplantation compensates for what the individual cannot learn on his or her own by providing an image of a transformation which is internalized and stored for later use. This is accomplished through

the overt execution of a process directly in front of the learner, causing by direct presentation what would otherwise have required direct manipulation by the individual.

Other research tends to support Salomon. Bandura, Ross and Ross (1963) found that young children will imitate televised models while Sullivan (1967) found that young children could learn conservation problems via film. Yussen (1974) found that in order for an action or a skill to be successfully imitated or transferred, the relevant aspects of the original situation must be observed.

Research on problem-solving (Gagne, 1966) has indicated that problem solution, i.e., overcoming a barrier to a goal, requires integration of previous experience with the requirements and limitations of the problem situation into a strategy of attack. Past experience may be the most crucial factor as it determines how the individual perceives the problem situation as a whole and all of the relevant aspects of the problem.

Whether a young child can observe the relevant aspects of a problem situation, much less a televised display embellished with devices designed to attract and maintain the attention of the viewer (Lesser, 1974), and apply what has been seen to a later situation is highly questionable. Research on the eye movements of young children (Vurpillot, 1976) indicates that young children tend to concentrate on the perceptually dominant features of a visual display. It is only after perceptual/cognitive structures have developed to the operative level that young children can observe in a coordinated fashion from a visual display information relevant to a specific question or problem (O'Bryan & Boersma, 1971).

Thus, the objective of this study was to determine whether young children will view the relevant aspects of a televised segment illustrating a problem-solving strategy in an entertaining fashion and then utilize this information as past experience for a subsequent problem-solving situation.

Method

Subjects

The subjects for this experiment were 51 males and 38 females ranging in age from 5.5 to 6.5 years of age. All were residents of a metropolitan suburban community and attended kindergarten classes in one of two schools. Subjects were randomly selected from all kindergarten students in both schools. The SRA Short Test of Educational Ability was administered to all subjects in their classes prior to their participation in this study as a measure of IQ.

Procedure

The eye movements of each child were monitored as they viewed one of two problem-solving videotaped segments. The experimental segment illustrated how to obtain an object out of arm's reach by using a tool (a hooked object in this case). This strategy was deemed appropriate for subjects of the age employed by pilot testing. The 100-second segment was produced by the researcher and employed live actors and puppets in a game-like situation. The 110-second control segment was produced by the Children's Television Workshop for the program "Sesame Street" and illustrated the solution of a classification task.

After viewing the appropriate segment each subject was taken to a separate room and asked to solve one of two problems. The identical problem was literally identical to that demonstrated in the experimental segment in terms of setting and situation. Several objects, some also used in the segment, were located about the area as potential tools, but not in such a way as to make their use as an aid to problem solution obvious. The transfer task employed the same strategy as the identical task but with different objects in a different setting. Again, objects were placed about for use as possible tools. Subjects were scored for their times-to-solution by an assistant viewing behind a one-way mirror according to a predetermined criteria for problem solution. The method of solution was also noted if solution was attained within the 5-minute limit provided each subject.

A 2 x 2 (Segment x Task) design was employed in this study. Subjects were randomly assigned to one of the four treatment groups. The number of subjects in each group was: Experimental Segment-Identical Task = 29; Experimental Segment-Transfer Task = 18; Control Segment-Identical Task = 23; and Control Segment-Transfer Task = 19.

In this experiment a Polymetrics Products Eye Movement Recorder employing the principle of corneal reflection was employed to obtain videotaped recordings of the eye movement patterns. The stimulus material was presented to the child by means of a Sony 9" television monitor connected to a Sony ½" videotape recorder. Placement of the stimulus material insured maximum use of the viewing area of the screen.

A bright spot detector was attached to the video line. The first spot in the field of view (the corneal reflection) to exceed a brightness threshold was detected by the device and transmitted in terms of the length of the synchronizing pulse from the beginning of the visual field to the location of reflection to a PDP-9 mini-computer where it was transformed to a coordinate point.

The points of fixation thus determined were compared to the location of objects (targets) relevant or irrelevant to the problem-solving strategy in the visual field during the course of the problem-solving segments. Several measures were employed: number of times each target was viewed, percentage of total number of fixations on target, and the percentage of the total time on target.

Results

Results of a 2 x 2 chi-square analysis indicated that frequency of solution of the identical task was significantly related to viewing the experimental segment ($\chi^2 = 20.66$, $df = 1$).

A 2 x 2 (Segment x Task) ANOVA with age and IQ as covariates was performed with time-to-solution as the dependent variable. The main effect for Segment was significant ($F(1,28) = 8.56$, $p < .01$) with the experimental segment group having the lower mean. The covariate age was also significant ($F(1,28) = 6.94$, $p < .01$). These results indicate that while the two tasks were relatively equal in difficulty, at least for those who could solve the problems, young children can only imitate problem-solving strategies viewed via television in identical situations and not transfer them to novel situations. The significant age covariate is accounted for by a significant

TABLE 1
PERFORMANCE ON FILM IDENTICAL AND TRANSFER TASKS

	Solution Attained	Experimental	Control	
<u>Identical Task</u>	No	7	21	28
	Yes	22	2	24
		29	23	52
	$\chi^2 = 20.66, df = 1, p < .001$			
<u>Transfer Task</u>	No	11	13	24
	Yes	7	6	13
		18	19	37
	$\chi^2 = .01, df = 1, NS$			

TABLE 2
ANALYSIS OF COVARIANCE: TIME-TO-SOLUTION BY FILM
AND TASK WITH IQ AND AGE

Source	Sum of Squares	df	Mean Square	F
Age	28,993.430	1	28,993.430	6.940**
IQ	79.810	1	79.810	.019
Film	35,761.129	1	35,761.129	8.560**
Task	15.608	1	15.608	.004
Film Task	16.674	1	16.674	.004
Residual	116,975.375	28	4,177.691	
Total	256,683.812	33	7,778.297	

** $p < .01$

positive Pearson correlation between age and time-to-solution in the Identical-Experimental group. ($r = .57, p < .01$). This was the only significant correlation to emerge between age or IQ and time-to-solution in any of the treatment groups.

Results of a 2 x 2 chi-square analysis indicated that, for those who solved the problem-solving task, viewing the experimental segment, as opposed to the control segment, was significantly related to the use of a hook as the solution tool ($\chi^2 = 7.54, df = 1, p < .01$), as opposed to any other possible solution. This indicates further that children were able to imitate the solution strategy demonstrated in the experimental segment.

Results of another 2 x 2 chi-square analysis were not significant ($\chi^2 = 1.45, df = 1$) which indicated no relation between segment viewed and type of behavior employed by nonsolvers in their attempts to solve the problem-

TABLE 3
SOLUTION AND NONSOLUTION BEHAVIOR

	Experimental	Control	
<u>Solution Behavior</u>			
Hook	28	5	33
Other	1	3	4
	29	8	37
$\chi^2 = 7.54, df = 1, p < .01$			
<u>Nonsolution Behavior</u>			
Tools	2	1	3
Motor	16	33	49
	18	34	52
$\chi^2 = 1.45, df = 1, NS$			

TABLE 4
SUMMARY OF REGRESSION ANALYSES

Variable	Pearson r	Beta Weight
Age	.55	.85**
Viewed hooked tool	.42	.50*
% Fixations--hooked tool	.59	.61**
% Time on Target--hooked tool	.53	.53**
% Fixations--hooked tool	.94	.89**
% Time on Target--hooked tool	.94	.99**
* $p < .05$		
** $p < .01$		

solving task. Ninety-four percent of the nonsolvers employed only motor behavior, as opposed to tools, in their attempts to solve the problem.

Comparisons using t-tests were conducted between problem task solvers and nonsolvers who had viewed the experimental segment. Separate analyses were performed for those who attempted the identical or transfer tasks. Dependent variables were the number of times each target was viewed during the segment, the percentage of the total number of fixations on target, and the percentage of the total time on target. No significant differences were found between problem-task solvers and nonsolvers in the analyses for either the identical or the transfer tasks. This indicates that the eye movements for solvers and nonsolvers were the same on the experimental segment.

Multiple regression analyses were conducted between time-to-solution, as

the dependent variable, and each of the three eye movement variables for those who viewed the experimental segment and solved the problem task. For those who solved the identical problem task significant predictors of times-to-solution were: age ($r = .55$), frequency of viewing the hooked tool used to solve the problem during the segment ($r = .42$), percentage of fixations on the hooked tool in an early scene ($r = .59$) and percentage of time on the hooked tool in an early scene ($r = .53$). For those who solved the transfer task, significant predictors of time-to-solution were: percentages of fixations on the hooked tool during an early scene ($r = .94$), and high percentages of time on the hooked tool during an early scene ($r = .94$).

Discussion

Results of the above experiment indicate that children can imitate a problem-solving strategy from a televised segment illustrating that strategy. However, children were unable to abstract the strategy and apply it to a transfer task. It may be that children can learn strategies from television but cannot recall the strategy in the face of overwhelming perceptual differences between the televised demonstration situation and their actual problem situation.

Subjects who viewed the experimental segment and solved the problem task employed the same strategy as that modelled in the segment. Those who did not solve the problem task did not use tools in their attempts to solve the problem.

Analysis of eye movement measures indicated that nonsolvers did not differ in their viewing patterns from solvers. However, several of the eye movement measures on strategy related targets were predictive of time-to-solution.

This leads to the conclusion that those subjects who solved the identical task, and possibly the transfer task, comprehended the experimental segment in terms of a problem and a strategy for the solution to that problem. Those who did not solve the tasks had only a very superficial comprehension of the conceptual content of the segment.

The results reported here suggest an intermediate ground between Salomon and Olson, at least for young children. While children can learn problem-solving strategies from television they cannot easily transfer that knowledge because of interference from different perceptual cues. If such techniques are to be included on educational programs for young children they should be accompanied by planned activities coupled with feedback from an adult, which will help the child transfer the strategy to real-life situation.

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ROGER BOURGEOIS

Université de Moncton

and

DOYAL NELSON

The University of Alberta

Young Children's Behavior in Solving Division Problems

Sixty children, ten in each age group from three to eight years, were presented with measurement and partitive division problems involving ferrying cars across a river and then parking the ferried cars beside some houses. Thirty of these children were also presented with similar problems but, this time, involving placing animals in cages. A year later, available children were brought in again. This time, forty-four children did the problems involving the animal cages and twenty-one did the ferrying problem. All behaviors of all subjects in both sessions were recorded on video tape. Careful analysis of these children's behavior while solving the problems revealed that: (1) Physical structure of apparatus used as vehicles for problems influences the ease with which children solve the problems; (2) Partitive division appears to be a more difficult process than measurement division; (3) Requirements for one task tend to carry over to a succeeding task or tasks and influence children's choice of problem solving procedure; (4) Mathematically irrelevant aspects of a problem distract different children in different ways. A discussion of these observations is included in this report. (Dr. Bourgeois is Associate Professor of Mathematics Education at Université de Moncton and Dr. Nelson is Professor in the Department of Elementary Education at the University of Alberta.)

The importance of developing problem-solving abilities in children is acknowledged in most texts and teachers' guides dealing with mathematics instruction. It appears, however, that methods and materials advocated for problem-solving activities are often based more on exhortation and testimonials than on empirical research (Getzels, 1964). It would seem reasonable to assume that if problem-solving is to be included in a model for mathematics learning, problem-solving situations which are appropriate must first be devised. The construction of these situations should be based on sound empirical evidence that certain situations are likely to elicit certain responses or behavior from young children.

Knowledge is lacking at present to indicate how children react to different aspects of a problem at different age levels. If some element of reality or other extraneous material is introduced into a problem, for example, how does a child behave when confronted with the situation? Does he see the mathematical aspect of the problem or is he distracted by its perceptual representation? To what degree does the apparatus or the configuration influence his response? Is there a transfer of behavior from one problem situation to another? It was in search of answers to such as these that Nelson and Sawada (1974, 1975) undertook a series of longitudinal studies.

It was the purpose of the study reported here to investigate the behavior of young children as they attempted to solve two division problems. These problems were among twelve designed for the Nelson and Sawada investigation.

Design

In order to furnish valuable information on the way children perceive a task, problems were designed in such a way that they did not necessarily require verbal responses for solution. Each of the two division problems used for this study consisted of a measurement division task and a partitive division task. The two problems were, for convenience, labelled the Cargo Groups Problem and the Animal Groups Problem. A different apparatus was used for each problem.

The apparatus for the cargo groups problem, illustrated in Plate 1, consisted of a masonite base 76 cm x 106 cm x 6 mm. At each end of the board 4 mm masonite sections, approximately 76 cm x 40 cm, were glued leaving a winding strip (the river), approximately 35 cm wide, across the middle of the board.

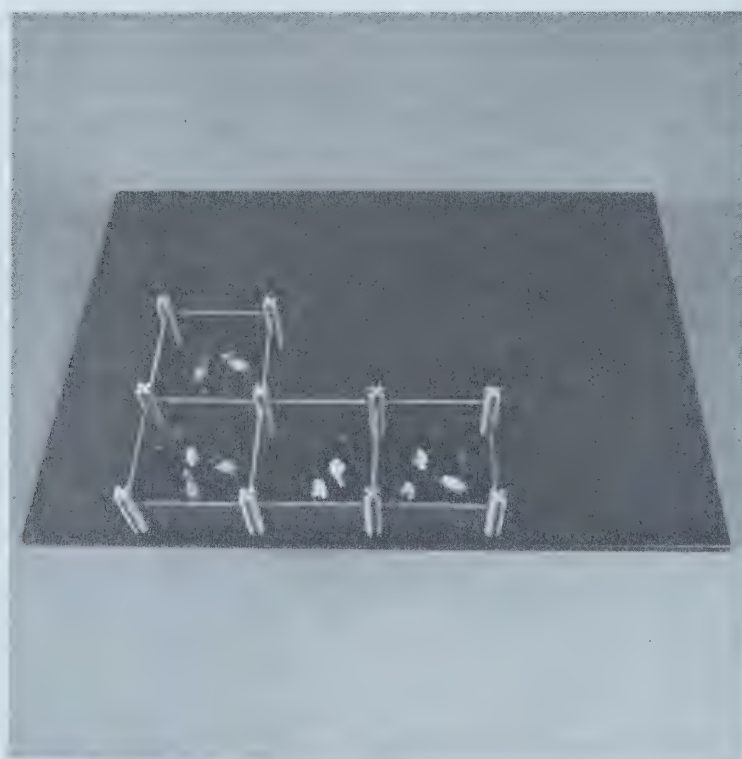


Two kidney-shaped islands in the middle of the river were made from 3 mm masonite glued to the baseboard. The river area was painted light blue and the islands were green. On each side of the river a large parking lot was painted black as was a roadway leading away from each parking lot. The remainder of the board was painted green.

There was a ferry boat of masonite with balsa wood sides, with one end convex and the other concave. The apparatus also consisted of 15 plastic toy cars of various colors. Three wooden blocks, one blue, one red and one brown were used to represent houses.

The cars were placed in the parking lot closest to the child and he was asked how many trips would be required for the ferry boat to take all the cars across to the other parking lot if the ferry boat were to take three cars at a time (measurement division). After the problem had been solved to the child's satisfaction, he was asked how many cars would be at each house if there were to be the same number at each house (partitive division).

The apparatus for the animal groups problem, illustrated in Plate 2, consisted of (i) a baseboard, (ii) posts, (iii) walls, and (iv) animals.



The baseboard, of 2 cm plywood, had dimensions 76 cm x 107 cm. Twenty-five holes formed a square array with centres 18 cm apart situated symmetrically on the board. The board was painted dark green.

Each post had four slots placed symmetrically around the circumference and the diameter was reduced at one end to fit the holes of the baseboard. The walls were made of 16.5 cm x 7.5 cm x 6 mm masonite slabs which could easily slide into the post slots. A set of twenty plastic and rubber toy animals completed the apparatus. This set consisted of four camels, four ducks, four mice, four hippopotamuses, an elephant, a moose, a horse and a lion.

The set of 20 toy animals was presented to each child who was asked to build enough cages so that there would be five animals in each (measurement division). After the task was completed, some cages were dismantled, or some were built, so that there were three, and two animals were removed. The child was now asked how many animals would be in each cage if there were the same number of animals in each cage (partitive division).

Each problem situation was presented to each child individually. The material was placed on a low table in front of the child. The interviewer sat at the child's right and adhered to a prearranged protocol. Behaviors of the subjects as they attempted the tasks were recorded on half-inch video tape. Transcription of behaviors was accomplished by devising a coding system capable of showing any action or sequence of actions. Verbalizations were recorded verbatim. Sample transcriptions of the coded forms may be found in Bourgeois (1976).

The data for the study were collected over a period of two summers. The sample for the Nelson and Sawada (1974) investigation involved 90 children, 15 at each age level three to eight. The first interviews were conducted in 1974. In this phase of the investigation sixty subjects, ten from each age group, were presented the cargo groups problem and thirty of these subjects, five from each age group, were also given the animal groups problem. This was called the cross-sectional phase of the study. Seventy-four of the original 90 subjects participated in the longitudinal phase of the study. The interviews for this phase were conducted one year later during the summer of 1975. Forty-four of the 60 subjects who had attempted the cargo groups problem in the longitudinal sampling were presented with the animal groups problem during the second interview. The cargo groups problem was also attempted by 21 of these subjects.

Observations

A descriptive analysis of the children's interaction with the apparatus while attempting the problems revealed a wide range of behaviors. In this paper, discussion of these behaviors will be divided into three parts: procedures employed by subjects in solving the measurement division problems of cargo and animal groups; procedures employed in solving the partitive division problems of cargo and animal groups; and response of subjects to distracting elements in the problem situations. The discussion will be of a descriptive nature. Complete statistical data are contained in Bourgeois (1976).

Measurement Division

The procedures employed by the subjects while attempting the problems ranged from highly manipulative to verbal responses. Most of the subjects up to age five were unable to solve the cargo groups problem involving measurement division. The three-year-olds for the most part could not follow the instructions. About fifty percent of the four- and five-year-olds were able to place three cars on the ferry and make the five crossings. But only one subject in this age range was able to state that it had taken five trips. This behavior persisted up to age seven. Almost all subjects placed the cars in a random order in the parking lot after taking them across on the ferry. It

appears that many subjects did not think to count the number of times they were taking cars across the river and were unable to solve the problem because the integrity of the groups was not maintained. Although several seven- and eight-year-olds chose to take the cars across the river on the ferry, about fifty percent in this age range solved the problem by either making five groups in the original parking lot or by simply stating that it would take five trips.

In general, the subjects had more success with the measurement division problem associated with the animal groups than with the cargo groups. This was especially noticeable with the four- and five-year-olds. Only two subjects solved the problem without building cages during the cross-sectional interviews while most eight- and nine-year-olds solved it in this manner in the longitudinal sampling. Very few subjects chose to solve the problem by building one cage at a time and placing five animals in each as they went along. Several subjects built more cages than were necessary. The younger subjects who did so tended to place animals in all the cages while the older subjects used only four cages. Placing an incorrect number of animals in the cages persisted up to age six.

Partitive Division

There was no appreciable difference between the proportions of success and failure in the two partitive division tasks. The number of successes increased with age. It was not until age seven, however, that the subjects appeared to have control over situations involving the partitive division process.

The procedures employed by the subjects in attempting these tasks were highly manipulative. Although the problems could have been solved by making groups on the table or by counting, none of the subjects employed these procedures during the cross-sectional interviews. Such procedures were used by eight- and nine-year-olds in the longitudinal sampling.

Quite surprisingly, the findings revealed that few of the subjects systematically distributed the objects one at a time in order around the houses or in the cages. This procedure was evident only 16 times in 155 attempts. Several of the subjects started a task by distributing three cars at each house or five animals in each cage. It appears that children using this latter procedure were influenced by the requirements of the measurement division tasks which they had attempted previously and which required them to make groups of three cars or of five animals.

After having completed the partitive division tasks, the subjects were asked if there were the same number of objects in each of the groups that they had made and also how many there were. Subjects up to age six who had failed to partition the objects equally had a tendency to state that the groups that they had made contained the same number. Most of the subjects up to age six who had partitioned the objects correctly counted the objects in each group for the purpose of verification even if they had previously stated that there were the same number in each group.

Behaviors Associated with the Distractions

When mathematical ideas are embodied in a problem-solving situation, many aspects of the situation are irrelevant to the concepts and may be

considered to be distractions. The two division problems which were designed to facilitate the study of young children's behaviors consisted of models of objects or animals with which the subjects could stimulate real world situations. In observing the procedures employed by the subjects as they attempted to solve the problems, it became apparent that many children were responding to distractions inherent in the various tasks.

The younger subjects responded more to the distractions than the older subjects but some behaviors associated with these persisted up to age eight. Several of the subjects up to age six pushed (or drove) the cars onto and off the ferry. Some subjects turned the ferry around so it would fit with the shore. Some of the younger subjects made motor sounds or pushed the ferry around an island during the crossings. A few subjects refused to place the cars on the "grass" around the houses; they preferred to park them on the road in front of the houses. Some subjects appeared to associate the colors of the cars with those of the houses.

In working with the animal groups, most subjects took particular care to assure that these were standing upright inside their cages. Most children would pick up an animal if it had fallen and carefully stand it up. Classification of the animals inside the cages was a behavior exhibited by subjects in all age groups but was more frequent among the older subjects. Some classified according to kind and others according to size. A few of the younger subjects refused to place the lion in a cage with other animals. Classifying the animals, however, did not appear to be a major factor in preventing the children from solving the problems.

Many subjects exhibited spontaneous verbalizations while attempting the various tasks. Such verbalizations appeared to be elicited mostly by the apparatus when the children were young and seemed to be more task related when they were older.

Discussion of the Findings

Although the findings of the present study do not generate guidelines for designing problem-solving situations, they do indicate certain aspects of such situations that influence children's behavior. The following general statements are supported by the data.

1. *The physical structure of mathematically equivalent problems designed for young children can make some more difficult to solve than others.* The measurement division tasks for the two problems were considered to have the same mathematical structure. In each, children were required to find how many groups of a given number could be made from a given set of objects. Most of the children in the age range four years to seven years were able to form the required groups in both tasks. Yet a greater proportion of the children in the age range correctly solved the animal groups measurement division problem. It should be pointed out that the cargo groups task was presented first in the cross-sectional sampling so one might suspect that the greater ease in solving the animal groups problem could be the result of learning in the first problem. However, in the longitudinal sampling the animal groups measurement division problem was given first and it still proved to be easier.

The perceptual aspect of the animal groups task seems to have aided the

subjects in solving the problem. They could look at the cages and see how many groups they had made. This was not the case with the cargo groups problem because the integrity of the groups was lost. If children are to understand the meaning of the transformation that they make with objects, it would seem reasonable to assume that they must reflect upon the results of their actions. It is only in this way that the young child may have logical-mathematical experiences as referred to by Piaget (1970). In devising equivalent problem-solving situations for young children, care must therefore be taken to monitor the kind of experiences that they will provide.

2. *It appears that the partitive division process requires a higher level of mental operation than does the measurement division process.* A comparison of solution results for the two animal groups tasks, which had many similarities such as placing animals into cages, revealed that more subjects were able to solve the measurement division task. Furthermore, certain procedures which had been used by some of the younger subjects in the measurement division task were only employed by the eight- and nine-year-olds in the partitive division task. These procedures involved sophisticated strategies such as making groups on the table without placing animals into cages. It appears that certain procedures used by the subjects to solve the measurement division problems were not available to them until they were eight or nine years of age when the mathematical process involved was partitive division. These findings suggest that solution results should not be the sole criterion in comparing the difficulty of two mathematical processes.

3. *The requirements of one task can influence young children's choice of procedure in attempting another task when the same apparatus is involved.* More than half of the subjects used a systematic procedure in distributing the objects while attempting the partitive division tasks. However, only about 10% of the subjects distributed the objects one at a time. Several subjects started the partitive division tasks by placing three cars at each house or five animals in each cage. It could be hypothesized that some children knew that they could make groups of three or five objects in the second task of a problem because they had done so in the first task. This appears to indicate that subjects who related tasks in this manner were focusing on some aspect of the groups with which they were familiar. It would seem reasonable to assume that such interaction with the material may permit simple abstraction to take place but may not be the basis for reflective abstraction. The present investigation suggests that we need to know more about how one task may influence strategies employed in another task. Such a dependence on another task for choice of procedure may be desirable in certain tasks but undesirable in other problem-solving situations.

4. *Mathematically irrelevant aspects of a problem may distract different children in different ways.* Although the data are inconclusive, there are indications that some responses to distractions may be of an idiosyncratic nature. Some subjects responded highly to the distractions while others seemed to pay little attention to them. The color of the cars and of the houses, for example, appeared to be a very distracting element for some subjects and not for others. Some responses appeared to be related to age and other to sex. Boys had a greater tendency than the girls to simulate in minute detail real world situations in the cargo groups tasks. Boys also

appeared to be distracted by the lion in the animal groups problem while the girls paid more attention to the smaller animals.

Several authors (Dienes, 1963; Skemp, 1971; Stevenson, 1975) have pointed out the paradox we face in designing problems for young children. In an effort to make problems interesting for children we often include irrelevant details. These details help to capture the child's interest but at the same time they may distract him from the information that is central to the problem. In designing problem-solving situations, the difficulty appears to be one of maintaining interest while at the same time eliminating distractions beyond a child's capabilities. Dienes (1963) defines the problem as that of finding the laws of interaction between three variables; (1) amount of noise generated, (2) amount of noise learner is able to cut through, (3) extent of motivation of the learner.

The present investigation was not set up to differentiate those distractions that would prevent the children from solving the problems from those that would not. It does reveal, however, the complexity of the problem and the findings suggest that the role of noise in problem-solving situations needs to be monitored very closely.

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J. HUNDERT

*The Sir James Whitney School
and*

B. BUCHER

The University of Western Ontario

Beginning Readers Discriminate Words by their Simplest Cue

Previous studies show that children often discriminate words on the basis of partial graphic features such as single letters, rather than the overall word configuration. This study examined features that control discrimination among artificial words, using early-reading children. Children learned to discriminate among trigrams in lists of four. Lists were presented to each of twelve children, in a counter-balanced sequence. Each list differed in the number of usable graphic cues available to discriminate the trigrams. It was hypothesized that lists in which a single letter cue could be used to distinguish between words would be learned in fewer trials than those requiring use of multiple-letter cues, but that more errors would occur in transfer tests when the single letter was removed. The hypothesis was accepted. (Dr. Hundert is psychologist at the Sir James Whitney School and Dr. Bucher is Associate Professor of Psychology at the University of Western Ontario.)

In learning word discrimination, a child may be taught to select from a list of printed words the correct version of a spoken word. This reading skill has been considered an important prerequisite to word pronunciation (Muehl, 1961; Zeaman & House, 1963). Reliable discrimination requires that a child learn to respond to those cues that distinguish the target word from the others presented. There may be more than one distinctive cue available for this purpose. For example the word *boy* may be discriminated from the word *red* by: any one of the individual letters, a combination of any two letters, or the entire configuration.

Which of these redundant cues the child selects may not be crucial for accurate word discrimination in a given training situation, as in the example. However, whether the child attends to simple or complex cues may affect his ability to discriminate the word in new contexts (Hundert &

Bucher, 1976). For example, after successfully discriminating the word *boy* from *red* on the basis of the initial letter, *b*, the child might be presented with the word *bat*. Confusion is likely to follow. Less confusion would be expected if the child had initially attended to a more complex cue, such as all of the letters in the word *boy*. Because of the possible relationship between redundant cue selection and transfer to new situations, it is important to study the factors determining the selection of word-cues in discrimination training.

One factor that may determine cue-selection is the position of the cue in the word. Marchbanks and Levin (1965) and Williams, Blumberg and Williams, (1970) found that young readers tend to recognize words by their first and last letters. Another possible factor is the simplicity of the word-cues. This was studied by Samuels and Jeffrey (1966). They found that a group of children who learned a word list in which words contained no common letters made more recognition errors in a transfer test than children who learned a word list with half the letters in common. In the transfer test, one letter in each word was replaced with a novel letter. These results must be regarded as inconclusive, however, because the two groups were given different numbers of transfer test trials. The former group was given eight trials while the latter was given four. It was not stated whether this difference was taken into account in the analysis of the number of errors on test trials.

The present experiment examined the hypothesis that children are more likely to attend to simple rather than complex cues when both are relevant for the discrimination. Specifically, it was hypothesized that when redundant word cues were available, beginning readers would select the simplest cue (the one containing the fewest letters). This hypothesis was tested by presenting beginning readers with lists of artificial words that differed in the availability of a single letter cue. It was expected that words in lists with an available single-letter cue would be learned in fewer trials than lists requiring use of more complex cues. Moreover, the removal of the single letter cue, once the word was discriminated, was expected to result in a greater number of errors in subsequent testing. Artificial rather than actual words were used to eliminate the possibility of familiarity with training items.

Method

Subjects

The 12 eldest children from a group of 23 attending a university preschool were selected as subjects. Five were boys and seven were girls. Their ages ranged from four years, one month to four years, eleven months with a mean of four years, eight months. Written parental consent for participation in the experiment was received for each child. No formal reading instruction was given in the preschool. Subjects were seen on alternative weekdays for an average of six sessions.

Design

Subjects were trained on three types of artificial word lists. Each list contained four trigrams that varied in the complexity of the cue that could

be used to discriminate among them. "Letters" on trigrams were graphic forms. Each trigram was taught individually in two phases. In the acquisition phase, subjects learned to discriminate each trigram from the other trigram in the list by a matching-to-sample procedure where they pointed to the trigram corresponding to a word spoken by the experimenter. For each of the twelve trigrams discrimination training was followed by a transfer phase where one letter in the trigram was replaced by a new letter. Deterioration in performance, across word lists, was used to identify which cue had been used in the discrimination.

Training Material

The trigrams were constructed in two parts. The "core word" consisted of the second two letters in the trigram and the "target letter" was the initial letter. Trigram construction began with the random selection of four artificial letters from a pool of 25. These four letters were then combined in pairs to form a set of four core words. The combination pattern was ab, ca,

ACQUISITION PHASE

	DISTINCTIVE	IRREGULAR	UNIFORM
	TARGET LETTER CORE WORD		
	$\Delta \circ \square$	$\sqcup \circ \square$	$\sim \circ \square$
	$\perp \neq \circ$	$\delta \neq \circ$	$\sim \neq \circ$
	$- \circ \neq$	$\sqcup \circ \neq$	$\sim \circ \neq$
CONTROL	$\Lambda \square \square$	$\delta \square \square$	$\sim \square \square$

TRANSFER PHASE

	$\cdot \circ \square$	$\mid \circ \square$	$- \circ \square$
	$\cdot \neq \circ$	$\mid \neq \circ$	$- \neq \circ$
	$\cdot \circ \neq$	$\mid \circ \neq$	$- \circ \neq$
CONTROL	$\cdot \square \square$	$\mid \square \square$	$- \square \square$

Figure 1. An example of Distinctive, Irregular and Uniform Word Lists during acquisition and transfer phases. The components of the target letter and "core word" are indicated and control trigram identified.

db and ac, where a, b, c, d represent four different letters. This procedure was repeated to produce three sets of core words, each with a different set of four letters. The three types of word lists were then constructed by adding a different pattern of target letters to each set of core words. An example of the three types of word lists and the artificial letters is shown in Figure 1. In the Distinctive List a different randomly selected artificial letter was added to the four core words in each of the three sets, resulting in a unique target letter for each trigram. In the Irregular List one of two artificial letters was added to each core word, so that the two trigrams shared the same target letter. The trigrams in the Uniform List were formed by adding the same artificial letter to all core words, so that all trigrams in this list shared the same target letter.

One trigram in each word list was used as a control for the tendency to focus on the first or last letter (Williams et al., 1970). As shown in Figure 1, these trigrams contained a unique middle letter. The control trigrams were used to test if subjects would attend to a simple cue regardless of its position in a word.

The set of cues that could be used to discriminate trigrams differed across word lists. These cues are shown in Table 1. The trigrams of the Distinctive List could be differentiated on the basis of the target letter alone, or four more complex cues that were also available for the trigrams of the Irregular List. Two multiple-letter cues could be used to differentiate the trigrams of the Uniform List. Other complex cues were also available; for example, trigrams could be identified by the position of particular letters. However, since these were consistent across word lists, they are not described. If, as predicted, there is selection of the simplest cues, subjects would be expected to discriminate the trigrams in the Distinctive List on the basis of their target letters.

TABLE 1
POSSIBLE USABLE CUES IN EACH WORD LIST

Word List	Possible Cues				
	Target letter alone	Target letter & middle letter	Target letter & third letter	Core Word	Entire Trigram
Distinctive	+	+	+	+	+
Irregular		+	+	+	+
Uniform				+	+

Apparatus

Each word list was printed on 11 cm x 32 cm cards with trigrams spaced 5 cm apart. The word lists were presented on a training apparatus, to control subject-experimenter interaction. The apparatus consisted of a 75 cm x 60 cm plywood front panel with side supports. Centered on the front panel were a row of four 8 cm x 8 cm plexiglas windows, which displayed a word list card. Subjects pressed one of the windows to indicate his answer. Each window was attached to a pressure sensitive microswitch leading to a control box behind the panel. Also connected to the control box were four red

pilot lights, one under each window. By turning a selector switch on the control box to a certain position a microswitch could connect to the correct pilot light. Therefore, pressing the correct window lit the associated light.

Procedure

Experimental sessions lasted 20 minutes. Subjects were removed from their preschool activities, escorted to the experimental room by a female experimenter, and seated across from the experimenter, with the training apparatus between them.

Two subjects were randomly assigned to one of six complete counter-balanced sequences of the three word lists. Trigrams in a word list were trained and tested individually in acquisition and transfer phases. Subjects were presented the trigrams in a word list before proceeding to the trigrams in the subsequent word list. As another precaution against possible position effects, a random half of the word lists were presented with the target letter occurring at the end of the trigrams. This was accomplished by inverting the card on which the word list was presented.

Acquisition Phase. Each session began with an acquisition phase. The four trigrams were displayed in the training apparatus. The subject was required to touch the trigram that corresponded to a pronounced label. Labels had been randomly selected without replacement from 25 names of simple objects such as "man" and "horse". For example if the word "boy" was selected, the experimenter would ask "Which word says boy?" If the response was correct, the red pilot light beneath that window would light. If an incorrect response was made the experimenter would say "no" and point to the correct trigram. Following an incorrect response, the subject was given four opportunities to respond correctly to the same trigram, using the same card. Once the trigram was correctly identified, or after four correction opportunities, the trigram was represented in a different order on a new card. Training on each trigram continued until it was correctly discriminated on four consecutive trials, or to a total of 24 trials. There was no need to impose this latter criterion.

Transfer Phase. The acquisition of each trigram was followed by a test of the cue used in that discrimination. This test consisted of measuring transfer when all the trigrams had their target letter replaced by a single unfamiliar letter. An example of a word list presented during transfer is shown in Figure 1.

A matching-to-sample procedure was conducted similar to that described for the previous phase. However, in this condition no feedback was given to prevent trial-to-trial learning. Four transfer trials were presented.

When the subject completed the acquisition and transfer phases for a trigram, he was given an opportunity to choose a snack such as a potato chip, peanut, raisin and so on. This was to encourage the subjects to continue the task. Immediate tangible rewards were not used because of evidence of their distracting effects (Spence, 1970).

Rationale for Word-Cue Analysis

The cues used to discriminate trigrams were assessed by examining relative performance on the three transfer word lists. The decision table

TABLE 2
IDENTIFICATION OF CUE BASED ON PERFORMANCE
DURING TRANSFER PHASES

Alternative Outcomes during Transfer			Resultant Identification of Cue
Distinctive low, Irregular low, Uniform low			entire trigram for all word lists
Distinctive high, Irregular high, Uniform high			core word for all word lists
Distinctive low, Irregular low, Uniform high			target letter plus one other letter for distinctive and irregular list and core word for uniform list
Distinctive	Irregular	Uniform	target letter for distinctive list, target letter plus one other letter for irregular list, core word for the uniform word list

shown in Table 2 shows how different outcomes were used to infer the child's cue-selection strategy. Uniformly low performance on the three word lists would suggest attention to the entire trigram for each word list. Uniformly high performance would suggest that the core word formed the basis of the discrimination. Low performance on the Distinctive and Irregular Lists with high performance on the Uniform List would indicate the use of the target letter in combination with another letter for the first two lists and the use of the core word for the Uniform List. Finally, if the subject performed poorest on the Distinctive List followed by the Irregular List and the Uniform List, different cues were used in each of the discriminations; the target letter was selected in the Distinctive List, the target letter in combination with another letter in the Irregular List and the core word in the Uniform List. This last outcome would be predicted by the hypothesis that the subject used the simplest cue.

Results

To determine if the counterbalanced sequence used to present the three word lists affected performance during acquisition and transfer, an analysis

TABLE 3
ANOVA SUMMARY TABLE FOR NUMBER OF TRIALS DURING
ACQUISITION AND TRANSFER

Source	Acquisition			Transfer		
	<i>df</i>	<i>Ms</i>	<i>F</i>	<i>df</i>	<i>Ms</i>	<i>F</i>
Between Subjects	2	5.6	1.2	2	6.1	1.4
Word Lists	2	128.0	35.5*	2	136.1	32.4*
Order	2	9.1	2.5	2	10.3	2.4
Residual	2	7.5	2.1	2	8.6	2.0
Within Subject	27	3.6		27	4.2	

* *p* < .01

of variance for a Latin Square design (Kirk, 1968) was conducted on the number of trials to criterion per trigram, during acquisition. Results are shown in Table 3. No significant effect due to the order of presentation was found. Also in Table 3, the same analysis on the number of correct responses per trigram during transfer found no significant order effects. The results were analyzed to determine if the position of the target letter affected the performance. A *t*-test for dependent measures showed no significant difference between trigrams with the target letter in the initial or final position during acquisition ($t = 1.0$; $df = 18$; $p > .10$) or transfer ($t = 0.8$; $df = 18$; $p > .10$) phases. In the absence of a demonstrated sequence or position effect, performance on each type of word lists during acquisition and transfer conditions were pooled, without regard to order of presentation or the position of the target-letter.

Acquisition

Results of an ANOVA for a Latin square design on the number of trials during acquisition is presented in Table 3 and indicates an effect of word lists ($p < .01$). Table 4 shows the arithmetic mean number of trials to criterion per trigram for the three types of word lists. A Sheffé test for pairwise comparisons indicated that subjects took significantly fewer trials to learn the words in the Distinctive List than either the Irregular ($F(1, 22) = 26.3$; $p < .01$) or Uniform ($F(1, 22) = 16.3$; $p < .01$) Lists. There was no significant difference between the performance on the Irregular and Uniform Lists ($F(1, 22) = 1.9$; $p > .10$).

TABLE 4
MEANS FOR TRIALS TO CRITERION DURING ACQUISITION
AND CORRECT RESPONSES DURING TRANSFER FOR
EXPERIMENTAL AND CONTROL TRIGRAMS

Word Lists	Acquisition	Transfer
<u>Experimental</u>		
Distinctive	5.8*	0.8*
Irregular	13.0	1.4*
Uniform	11.1	2.6*
<u>Control</u>		
Distinctive	5.3	1.6*
Irregular	7.3	2.3
Uniform	7.0	2.8

* $p < .01$ on Sheffé test for ANOVA

Transfer

The transfer conditions were important for identifying the cues used during the acquisition of a word. As shown in Table 3, ANOVA for Latin square designs indicated an effect of word lists during transfer ($p < .01$). The arithmetic mean number of correct trials for each of the three word lists is

presented in Table 4. A Sheffé test for pairwise comparison indicated a significant difference between the Distinctive and Uniform Lists ($F(1, 22)=1.97$; $p > .10$), Distinctive and Irregular Lists ($F(1, 22)=23.3$; $p < .01$) and Uniform and Irregular Lists ($F(1, 22)=12.6$; $p < .01$).

As outlined in Table 2 this result indicates that the subjects attended to the target letter in the Distinctive List, the target letter in combination with another letter in the Irregular List, and the core word in the Uniform List.

Control Trigrams

The results on the control trigrams during acquisition and transfer conditions were analyzed for by a Latin Square ANOVA and are shown in Table 5 with means for word lists in Table 4. During acquisition, effect of words lists was statistically nonsignificant. Subjects took approximately the same number of trials to discriminate a trigram for each word list. During the transfer condition, there was a significant effect of word list ($p < .01$). A Sheffé test for pairwise comparisons indicated that this effect was attributable to the difference between the Distinctive and Irregular ($F(1, 22)=12.6$; $p < .01$) and the Distictive and the Uniform Lists ($F(1, 22)=13.7$; $p < .01$). There was no significant difference between the Irregular and Uniform Lists ($F(1, 22)=1.7$; $p > .10$).

These results indicate that the availability of simple cue in the middle of the trigram allowed the subjects to discriminate the control trigrams for each word list with equal speed. During transfer, the removal of the target letter had minimal effects on the Irregular and Uniform Lists, with greater detriment to the Distinctive Lists. The lower performance on the Distinctive List can be explained by the availability of two simple cues — the target letter and the middle letter. The subjects' cue-selection was divided between those two choices. These results suggest that the subjects searched for the simplest cue for the discrimination of a trigram regardless of its position.

Conclusion

The results of this study support the hypothesis that the preschool children in this study used the simplest cue for the discrimination of word-like stimuli. This conclusion was based on two findings. First, subjects took

TABLE 5
ANOVA SUMMARY TABLE FOR NUMBER OF TRIALS DURING
ACQUISITION AND TRANSFER FOR CONTROL TRIGRAMS

Source	Acquisition			Transfer		
	<i>df</i>	<i>Ms</i>	<i>F</i>	<i>df</i>	<i>Ms</i>	<i>F</i>
Between Subjects	2	10.6	1.4	2	13.5	2.1
Word Lists	2	17.2	2.1	2	54.5	8.5*
Order	2	11.5	1.4	2	14.3	2.2
Residual	2	9.3	1.1	2	13.4	2.1
Within Subject	27	8.1		27	6.4	

* $p < .01$

significantly fewer trials to learn the trigrams of the Distinctive List, where a single letter (the target letter) could be used to distinguish between words. The selection of the target letter rather than a more complex cue facilitated the acquisition of the list. Second, although the Distinctive Lists were acquired faster, replacing the target letters with another letter produced a high number of errors during transfer. Fewer errors occurred on the Irregular and Uniform Lists, respectively. This finding is consistent with the hypothesis that the subjects discriminated words according to their simplest cue as shown in the decision table in Table 2.

This study has direct implications for reading instruction. The results suggest that when presented with a word to discriminate from other words, children attend to the simplest usable cue. Frequently this would be a single letter. Although this strategy might be effective in the training situation, it will not aid discrimination when the child encounters similar-appearing words. The child sacrifices later generalization for speed of discrimination.

It may be more efficient to teach a child to attend to the entire configuration of the word. Hundert and Bucher (1976) trained children to point to a word when it was presented with other similar-appearing words. They showed that this training not only made it easier to learn to pronounce the words but also reduced later confusion. This result indicated that the context of word discrimination is important for reading instruction. The context determines the number of cues available to the reader and can force him to attend to complex cues which, although more difficult to learn, may produce better transfer.

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Requests for reprints should be sent to Joel Hundert, The Sir James Whitney School, Belleville, Ontario, Canada K8P 1B2.

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R. F. MARCUS

and

BABETTE JENNY

University of Maryland

A Naturalistic Study of Reciprocity in the Helping Behavior of Young Children

A time-sampling method with a preset category system was used to record the psychological and task helping behavior of preschool children of diverse family backgrounds. Each child also completed a sociometric test and was rated on his relative helpfulness by two teachers.

Help given by children was reliably reciprocated by other children. Reciprocity was stronger when the recipient was liked by the giver and weakest when the recipient was disliked. Homan's exchange theory was used to explain why high sociometric status children received more help than they gave while their low status peers had to engage in more helping activity and received less in return. A negative relationship between sociometric status and both psychological and directed help received was found. A positive relationship was found between teacher ratings of task helping and sociometric status, but this relationship was not found for sociometric status and direct observation measures of help given. Most helping behavior occurred between children of the same sex. Consistent sex differences in favor of males over females were found for total and task help given and received as well as for psychological help given. (Dr. Marcus is Assistant Professor in the Institute for Child Study, College of Education, University of Maryland and Ms. Jenny is a graduate student in the same department.)

One does not have to search far in order to uncover the kinds of moral teachings children hear and learn by direct tuition and other means. "One good turn deserves another" and "do unto others as you would have them do unto you" are familiar phrases which indicate a generalized norm or expectation that benefits given should at some point be repaid. Only a few laboratory experiments on various kinds of benevolent behaviors have studied the variables which are likely to govern reciprocity, while no naturalistic research studies have progressed beyond the point of support for the general statement that benevolence reaps benevolence. The present study represents a naturalistic analog (to laboratory experimentation) which

attempts to demonstrate some of the factors which govern reciprocity within a nursery school setting.

Gouldner's (1960) article on the norm of reciprocity goes far beyond the simple statement of reciprocity as a universal moral principle which governs interactions between roles, groups or institutions, for which he is often given credit. His general statement of reciprocity was framed in terms of reciprocation of "helping" behavior. Reciprocity was not seen as an all or none principle, but was seen as conditional upon some of the following factors:

[the] value of the benefit and hence the debt is in proportion to and varies with—among other things—the intensity of the recipient's need at the time the benefit was bestowed ("a friend in need . . ."), the resources of the donor ("he gave although he could ill afford it"), the motives impugned to the donor ("without thought of gain") and the nature of the constraints which perceived to exist or be absent ("he gave of his own free will"). (p. 171)

This rich source of hypotheses was further augmented by a suggestion that in some cultures friendship obligates one to reciprocate and that this reciprocity might play a major role in maintaining the stability of friendships as well as other social systems. One might expect to find reciprocity varying across different levels of relationship between children. Some of these hypotheses have been investigated, at least partially, within laboratory settings.

Goranson and Berkowitz (1966) created a situation in which college women received voluntary help with a dull task, involuntary (solicited) help, or a refusal to help from a "supervisor." Women who received voluntary help worked hardest to "repay" the favor when they were given the chance to help the supervisor. On the basis of this and similar research Schopler (1970) suggested that only when help is perceived as altruistic by the recipient, and the donor is not perceived as having acted according to his own interest (e.g., is not seen as "manipulative"), is help likely to be reciprocated.

Staub and Sherk (1970) placed fourth grade children into a somewhat more naturalistic setting in which children listened in pairs to tape-recorded stories and one of the children was given the opportunity to share candy with the other child. The number of candies shared related positively to the length of time the receiver child shared his crayon during a later drawing session. Mutual friends were found to share the crayon for a longer period of time than non-mutual friends. Although the reciprocity between candy sharing and later crayon sharing was more highly related in mutual pairs than in non-mutual pairs, neither of these correlations was significant, nor was the difference between these two correlations significant. The suggestions of reciprocity varying with the affectional quality of the relationships between children could still be viewed across a wider range of relationship, i.e. friends, non-choice and negative choice relationships in order to see whether there is a significant shift in reciprocal relationships. The present study will pursue this further.

Naturalistic observation studies have shown that, in its most general sense, the norm of reciprocity operates within preschool settings. Positive behavior on the part of children tends to be correlated with positive behavior toward that child from others. Charlesworth and Hartup (1967) found that

among 3- and 4-year-olds the more reinforcements the children gave the more reinforcements they received from others. Kohn (1966) studied the social behavior of 11 kindergarten children and recorded the number of positive and negative initiations given and received by the children. Positive initiations referred to kind things said to another, invitations to interact, etc., also included directions and assistance in a constructive manner (task helping). The findings indicated a positive and significant relationship between positive acts initiated by the child and positive acts initiated toward him. Such studies have not explored any of the intricacies and qualifications of the reciprocity norm as have the writings of Gouldner and the laboratory research.

The present investigation is an examination of the norm of reciprocity within a preschool setting focusing specifically upon helping behavior. Both psychological and task helping is considered as is the positive or negative regard in which the giver holds the receiver as these factors relate to reciprocity in helping behavior. As suggested in the above literature, the importance of voluntarily given and involuntarily given help will be examined.

Method

A time-sampling technique was employed using a preset 10 category system of helping behavior. Nineteen preschool children were observed over a period of 1½ months time and, toward the last third of this period, were administered a test of sociometric status. Two classroom teachers rated each of the children of 10 bipolar scales of helpfulness derived from the direct observation system.

Subjects

The subjects observed and tested in this study were 19 children between the ages of 59 and 74 months ($\bar{X}$ =66.6 months) who were attending the University of Maryland's Center for Young Children. The children were selected for the Center in such a manner that they represented diverse family backgrounds.

Observers

Three observers were trained to use the time sampling technique (including one graduate and two undergraduate students). The author and one of the students served as reliability checks throughout the study while the data used in the following analyses was that of the two observers who were not aware of the hypotheses of the study.

The Coding System of Helping Behavior

The coding system represents a synthesis of helping behaviors recognized in naturalistic studies by Severy and Davis (1971) as varieties of both psychological and task helping behavior, and a system used by Hartup and Keller (1960) which dealt with psychological helping within the context of nurturance. In addition, Leiserson (1975) had collected 157 anecdotes of helping behavior over a year's time with all teachers and assistants writing down episodes they considered to be of a helping nature. The four

observers worked on developing a classification system which would encompass these anecdotes as part of the training period. The following 10-category system was arrived at:

- I. Gives Protection:
 - 1. verbally defends
 - 2. physically defends
 - 3. gives warning
- II. Gives Comfort or Reassurance:
 - 4. verbally comforts or reassures
 - 5. physically comforts or reassures
- III. 6. helps out of distress
- IV. Helps with Task Verbal:
 - 7. advises, suggests, directs
 - 8. informs of third person's need
 - 9. offers instrumental help
- V. Helps with Task-Physical:
 - 10. gives instrumental help.

Analyses in this study focus only upon "Total Help" (all categories), "Task Help" (categories 7-10), "Psychological Help" (categories 1-6), and "Directed Help."

Additional distinctions were made by the observers, including whether the behavior was "directed," that is, requested or directed by another, or "nondirected," not solicited by another. The observers also recorded whether the behavior was performed by the child or received by him, the name of the child giving or receiving the help. Finally, a very brief description of the episode was recorded at the bottom of the protocol.

The time-sampling technique entailed a recording of all helping behavior given or received by a particular child for a five-minute period of time, with a randomly ordered series of children viewed successively. Absent children were picked up on the following day. Observation was done only during free play and at the beginning of snack time since preliminary observation indicated that these provided maximal opportunities for helping. The 19 children were observed for 12 units of time, or a total of one hour per child over a span of 1½ months.

Reliability of the Coding System

Following the suggestions made by Patterson, Cobb and Ray (1970), which indicated that unmonitored observers might show abrupt decline in the reliability of their observations, and since there were four different observers, special care was taken to prevent such instrument deterioration. Observers were trained for one month while observing a class other than the one on which study data were collected. All observers then observed for three hours at the beginning of the data collection period (first reliability check) and then for 1½ hours after 50% of the observations had been completed (second reliability check). Throughout the entire data collection period, observers worked in pairs and thus it was possible to obtain reliability figures for these two pairs over approximately 9½ hours of observation for each. Correlation coefficients ranged from .74 to .96, indicating an acceptable reliability level.

Validity of the Coding System

The coding system has face validity in that other authors (indicated above) have recognized the behaviors as helping and by the fact that teachers collected anecdotes which they considered to be helping behaviors which were here used to modify the coding system.

In addition to the above, teachers were asked to rate each child on 10 bipolar dimensions which were derived from the 10-category direct observation coding system. Seven-point Likert scales were constructed for each dimension so that the two classroom teachers could rate the likelihood that each child would demonstrate a particular kind of helping behavior. Correlations between overall teacher's ratings of helpfulness and direct observation were found to be $r = .42$ ($p < .10$) for "total help given," $r = .42$ ($p < .10$) for "task help given" and $r = .50$ ($p < .05$) for "psychological help given," while the corresponding correlations for teacher 2's ratings were $r = .65$ ($p < .01$), $r = .65$ ($p < .01$) and $r = .73$ ($p < .01$).

Sociometric Status

Moore and Updegraff (1964) used a picture sociometric test in which children were asked first to identify all children on a board which contained all the pictures of the children in the class and then asked to locate the pictures of four children the child liked and four children the child didn't like. This technique was used in the present study by two female research assistants. Retest scores for the Moore study, over a period of a few weeks, indicated reliabilities of .62, .52 and .78 for three different nursery school groups when the measure was calculated as number of positive minus number of negative choices. This same measure of popularity was used in the present study. Validity of the measure was supported by negative correlations between popularity and child's dependency upon adults.

Results

Sex Differences

One-way analyses of variance were performed to examine sex differences for total help given, total help received, psychological help given, psychological help received, task help given and task help received. The findings may be seen in Table 1.

The analyses revealed that significantly greater helping behavior was

TABLE 1
ANALYSES OF VARIANCE FOR SEX DIFFERENCES

Variable	Mean Boys	Mean Girls	F
Total Help Given	25.8	13.8	8.0 *
Total Help Received	33.4	25.9	4.8 *
Task Help Given	24.0	13.4	7.6 *
Task Help Received	31.7	25.2	4.0
Psychological Help Given	1.3	.33	6.2 *
Psychological Help Received	1.7	.67	.81

performed by boys than was performed by girls in all categories of behavior except psychological help received. Since the bulk of total helping behavior was composed of task helping, the sex difference findings were expected to be similar in both instances, and were.

The data were also subjected to a series of one way analyses of variance in order to determine whether helping took place primarily within or between sexes. The results of these analyses may be seen in Table 2. In all categories of helping behavior analyzed, helping took place primarily between children of the same sex. Although the frequency of psychological helping, for girls in particular, was too small to permit parametric analyses, one may see the same picture of same sex helping as dominant. The sum of help given and received with same sex interactions versus opposite sex interactions for boys was, respectively, 13 and 4 while for girls the corresponding figures were 4 and 1. Thus, it is quite clear that helping takes place primarily within and not between the sexes.

TABLE 2
ANALYSES OF VARIANCE FOR HELPING BETWEEN AND WITHIN SEX

Group and Variable	Mean to Boys	Mean to Girls	F	Mean from Girls	Mean from Boys	F
Boys						
Total Help	2.5	13.2	8.25*	2.8	12.1	14.8**
Task Help	2.2	12.6	9.05**	2.7	11.6	12.8**
Girls						
Total Help	4.11	.56	12.2 **	6.3	1.2	10.7**
Task Help	4.89	.78	8.79**	6.67	1.33	8.8**

* $p < .05$

** $p < .01$

Reciprocity in Helping Behavior

Table 3 presents the intercorrelations between varieties of help given and received and their relationships to sociometric status of age.

The central hypothesis of reciprocity in children's helping behavior is supported in a number of ways: the correlation between total help given and total help received is $r=.80$ ($p < .01$), indicating that children who give greater help tend to receive more help; help given to children correlates highly with help received from children ($r=.89$, $p < .01$); help given to teachers correlates positively with help received from teachers ($r=.57$, $p < .05$). These measures of helping include both nondirected voluntarily given or unsolicited help and directed (solicited) help, although the former are far greater in number. When directed help is considered alone, the correlation between directed help given and directed help received is $r=.00$ (note: lower reliability on this variable may have mitigated against finding a correlation). Directed help given is similarly uncorrelated with total help received ($r=.04$) and help received from children ($r=-.16$). Therefore, help given is reciprocated when it is given voluntarily, but not reciprocated when it is requested.

TABLE 3
PRODUCT-MOMENT CORRELATIONS FOR HELPING MEASURES,
AGE AND SOCIOMETRIC STATUS

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Total Help Given											
2. Total Help Received	.80**										
3. Help Given--Children	.96**	.72**									
4. Help Received--Children	.88**	.87**	.89**								
5. Help Given--Teacher	-.10	.06	-.38	-.23							
6. Help Received--Teacher	-.26	.15	-.41	-.36	.57*						
7. Directed Help Given	.00	.04	-.22	-.16	.74**	.39					
8. Directed Help Received	.25	.28	.26	.19	.11	.15	.00				
9. Sociometric Status	-.08	-.02	-.07	-.03	.00	.03	-.33	-.49*			
10. Teacher 1--Total Helping	.42	.26	.41	.36	-.04	-.24	-.20	.12	.30		
11. Teacher 2--Total Helping	.65**	.56*	.66**	.63**	-.18	-.21	-.24	.02	.34	.70**	
12. Age	.11	.12	.20	.13	-.36	-.02	-.55*	.34	-.06	.05	.24

* $p < .05$
** $p < .01$

Help received from teachers was found to correlate positively with directed help given ($r=.39$, $p < .10$) and negatively with help given to children ($r=-.41$, $p < .10$). Therefore, children who are helped more by teachers are more likely to respond when requested to help teachers and other children. However, the greater the help received from teachers, the less likely they were to help other children spontaneously (when not requested). This interpretation is suggested since the greater proportion of total help given and help given to children was nondirected help in kind.

Helping and Sociometric Status

Although direct observation measures of total help given, help given to teachers and help given to children correlate near zero with sociometric status (respectively $r=.08$, $.00$ and $-.07$), sociometric status correlates negatively with directed help received ($r=-.49$, $p < .05$). Children who solicit help or have help solicited for them tend to be less popular with their peers. It should be pointed out that both teacher ratings of helping correlate positively yet nonsignificantly with sociometric status ($r=.30$ and $r=.34$ for teachers 1 and 2 respectively). Later analysis of teacher ratings of task helping will show this trend to be of greater magnitude. Since the correlation between directed help given and age is negative ($r=-.55$, $p < .05$) it may be that teachers and other children feel it is necessary to solicit or prompt helping in the younger but not the older children.

The sample was then divided at the mean on sociometric status and helping behavior was subjected to a 2 (sociometric status) x 2 (help given help received) analysis of variance with repeated measurement taken across the latter variable. The findings indicated two-way interaction with high status children receiving more help than they gave while lower status children gave more help than they received ($\bar{X}$ high status-given=10.0, $\bar{X}$ high status-received=11.2, $\bar{X}$ low status-given=17.6, $\bar{X}$ low status-received=14.4, $F=4.16$, df 1/17, $p < .07$). A Newman-Keuls comparison between the

means reveal that only the differences between the first two as compared with the third of these means are significantly different ($p < .05$). When both help given and received are considered together, the lower status children showed greater helping than the higher status children ($\bar{X}$ lower status=32.0, $\bar{X}$ higher status=21.2, $F=19.2$, df 1/17, $p<.01$). Thus lower status children are involved in more helping exchanges, although they appear to get less in return for their assistance than do the more popular children.

Reciprocity, Helping and Friendship Status

In order to see whether reciprocity in helping behavior was dependent upon the degree of friendship between children, correlations were computed between help given and received for three groups: positive choice (selected as liked), neutral choice (not selected as positive or negative choice), negative choice (selected as disliked). The correlations for help given and received for the three groups were $r=.87$ ($p < .01$), $r=.62$ ($p < .01$) and $r=.52$ ($p < .05$) respectively. Testing the difference between the correlations using a test for independent samples, only the difference between the first and last correlations was significant ($Z=2.16$, $p < .05$ for a two tailed test). Children are more likely to have their help reciprocated from someone who is liked rather than someone who is disliked.

The above, of course does not reflect the amount of help given to others who vary in friendship status. The amount of help given to positive, neutral and negative choice children was subjected to a one-way analysis of variance. The results revealed the means to be 7.6, 3.5 and 1.5 respectively, and with df 2/54, $F=7.3$, $p < .01$. Using the Newman-Keuls procedure (Winer, p. 216) for testing differences between all pairs of means, all means were found to be significantly different from one another ($p < .05$).

Although low frequencies do not permit parametric analysis, it is interesting to note that of the children who gave psychological help to other children ($n=6$) or received help from other children ($n=3$), all psychological help was given or received from children who were liked and none was given

TABLE 4
PRODUCT-MOMENT CORRELATIONS FOR PSYCHOLOGICAL HELPING,
AGE AND SOCIOMETRIC STATUS

Variable	1	2	3	4	5	6
1. Psychological Help Given						
2. Psychological Help Received	.29					
3. Sociometric Status	-.17	-.55*				
4. Age	.28	-.07	-.06			
5. Help Received--Teacher	-.27	.27	.07	-.13		
6. Teacher 1--Psychological Help	.52*	.06	.26	.17	-.34	
7. Teacher 2--Psychological Help	.80**	.01	.23	.23	-.26	.74**

* $p < .05$

** $p < .01$

TABLE 5
PRODUCT-MOMENT CORRELATIONS FOR TASK HELPING,
AGE AND SOCIOMETRIC STATUS

Variable	1	2	3	4	5	6
1. Task Help Given						
2. Task Help Received	.81**					
3. Sociometric Status	-.07	.06				
4. Age	.09	.01	-.06			
5. Help Received--Teacher	-.26	.04	.07	-.13		
6. Teacher 1--Task Help	.26	.25	.51*	.00	-.19	
7. Teacher 2--Task Help	.48*	.54*	.44	.24	-.23	.59**

* $p < .05$
** $p < .01$

or received from nonfriend or a negative choice child. Children respond to others in distress only if they are considered friends, particularly with this personal form of assistance.

Psychological Helping

Table 4 represents the correlation between psychological helping, age and sociometric status.

The correlation between psychological help given and received is positive but nonsignificant ($r = .29$), indicating that reciprocity is not present here with responses to distress. The significant negative correlation between psychological help received and sociometric status ($r = -.55, p < .05$) indicates that those children who received the most psychological help tended to be the less popular children. It might be that their helping might be somewhat less acceptable to the other children and thus are given less of a chance to reciprocate this help, or they may feel less sure of their helping ability.

Task Helping

Table 5 represents correlations between task helping, age and sociometric status.

As was expected, since total help is largely composed of task helping responses, the results ($r = .81, p < .01$) regarding the correlation between help given and received are almost identical with previous results reported. What is present here, but not in earlier sections is the relationship between teacher ratings of task helping and the sociometric status of the child ($r_{t1} = .51, p < .05$; $r_{t2} = .44, p < .06$). Children who were rated as more helpful by their teacher tended to be the more popular with their peers. Direct observation measures of task help given do not correlate highly with sociometric status ($r = -.07$). Thus there is support for the relationship between teacher ratings of task helpfulness and sociometric status.

Discussion

Reciprocity was found to be present in the helping behavior of young children when both total helping and task helping behavior was considered.

Help given to teachers also appeared to be reciprocated. Reciprocity was found in the area of psychological helping, but to a lesser degree, and was not present when the helping behavior was solicited. That solicited help was not reciprocated might be explained in several ways. These findings support the Goranson and Berkowitz (1966) results with adults in which solicited help was seen as less valuable than voluntary assistance and tended not to be reciprocated. In the present study, the children who received the most solicited and psychological help were also the least popular and younger children and thus it is also possible that the reciprocation of their helping might not have been required or desired. The question of lower reliability of this item is not seen as a severe limitation since other significant correlations were found between this variable and sociometric status (see below).

The question of the value of the help being given was also considered with regard to the sociometric status of the giver. The results indicated that higher status children received relatively more help than they gave; the reverse was found for the low status children. Low sociometric status children were engaged in greater giving and receiving of help than higher sociometric status children. These results might be explained in terms of Homan's (1961) social exchange theory which would predict that the value of one child's assistance to another would be directly related to the former's overall social status, which in turn has been found related to such variables as cooperativeness with routines, social participation, friendliness, etc. (Moore, 1967). Low status children would have to engage in more helping activity than their high status peers to receive an equivalent "return" from their efforts.

Reciprocity also occurred regardless of whether the child considered the recipients his friends, nonfriends (neutral choice), or disliked peers. The correspondence between help given and received was, however, stronger for liked than disliked children and the total amount of helping given was dependent upon the child's liking of the recipient: the greater the liking the more help the child gave. This could be a reflection of the greater amount of time a child spends with his friends, thus providing greater opportunity for reciprocation. It might also suggest that receipt of help from one who regards you positively creates an obligation to reciprocate, regardless of whether the liking is mutual, whereas this obligation to repay might not be as strongly felt toward someone who dislikes you. Finally, help given by someone who likes you might be perceived as more valuable and/or less motivated by self interest than help given by one who dislikes you.

The results showed a negative correlation between psychological and directed help received, sometimes referred to as indices of dependent behavior, and sociometric status. McCandless, Bilous and Bennett (1961) found that low status children exhibited the greatest emotional but not instrumental dependency. Moore and Updegraff (1964) found a similar negative correlation for the youngest group of children between sociometric status and a composite measure which included affection and support seeking from adults. Moore (1967) suggested that either emotional dependency may be regarded as inappropriate behavior by other children or that this behavior may simply limit the amount of time the child spends establishing

friendships with his peers. The present findings indicate that the children who receive more help from teachers also tend to give less help to peers, thus suggesting that teacher help might tend to limit the amount of time a child spends helping his peers and possibly opportunities for friendship formation.

Sex differences were found here quite consistently in favor of males over females. Severy and Davis (1971) did not analyze their naturalistic findings on helping behavior for sex differences and Hartup and Keller (1960) did not find sex differences in nurturance. Neither have laboratory studies on altruistic behavior uncovered consistent sex differences (see Maccoby & Jacklin, 1974 for a review and summary of these studies). However, the research is much more convincing with regard to sex differences in aggression in which males are found to be more aggressive than females (Maccoby & Jacklin, 1974) and this may have implications for the study of sex differences in helping behavior. Greater aggressiveness on the part of boys in naturalistic settings might place them at the scene of emotional distress, at times caused by the comforter himself, thus providing greater opportunity to respond with psychological helping. Anecdotal evidence from the present study also suggests that the boys frequently engaged in gross motor play with large wooden blocks which provided considerable opportunity for help in carrying and passing them back and forth. It did not appear that the girls had a smaller number of opportunities for task help in their activities.

Other avenues of research which are suggested by the principle of reciprocity concern both the maintenance and initiation of friendship relationships. Gouldner (1960) suggested that the beginnings of new friendships might be characterized by reciprocal trading of benefits. In this way uncertainty may be reduced and trust established. It is also suggested that once such obligations are created that there is also an accompanying obligation not to harm the giver of benefits. Reciprocity might also be present while liking for another is great, but might break down as either an antecedent or a consequence of the termination of a friendship. Such developmental investigation of the initiation and maintenance of friendships could be viewed with regard to tradeoffs in a variety of benefits (helping, compliments and encouragement, etc.) which may or may not be traded off in equivalent portions. Determination of "equivalence" of benefits is itself a concept requiring further explication. A friendship between a child of high and a child of low sociometric status might require that the benefits given by the latter be much greater; the relationship is imbalanced and requires greater sacrifices by the less powerful partner, yet might be sustained despite lack of reciprocity by the more powerful partner.

Research on the concept of reciprocity entails assumptions about the nature of kind acts toward others which are quite different than those basic to the conceptualization and study of altruism. For example, the former assumes that one does not get something for nothing, while the latter does not. It is a more materialistic and pragmatic view in which helping another in need might actually take place with the giver intending to create a debt which can be collected later. Although perhaps a less noble view of man's interpersonal behavior than concepts of altruism might imply the ex-

planatory power of such normative rules has just begun to receive systematic investigation.

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R. J. WILLIAMS

Cumberland Valley School System
and

BOB ALGOZZINE

University of Florida

Differential Attitudes Toward Mainstreaming: An Investigation

The issue of mainstreaming exceptional children has received considerable professional attention. Little has been done to investigate regular teachers' attitudes toward inclusion of handicapped children in their rooms. This study attempted to assess classroom teachers' opinions about several factors relevant to mainstreaming. The results indicated that attitudes were different for different handicapping conditions. Some implications with regard to teacher training practices and success of mainstreaming are presented. (Dr. Williams is Director of Special Education, Cumberland Valley School System and Dr. Algozzine is Assistant Professor in the Department of Special Education at the University of Florida.)

The subject of mainstreaming has become an area of considerable professional interest; it suggests that physically, mentally and emotionally handicapped youngsters be included in regular classes with extra support from special personnel as required. Cegelka and Tyler (1970) have summarized the arguments for and against the inclusion of special children in regular classrooms.

Mainstreaming is generally supported by literature which indicates that the population of some special classes is culturally and socially dominated (Dunn, 1968); that the academic advantages do not outweigh the sociological disadvantages of placement (Christopolos & Renz, 1969; Goldstein, Moss & Jordan, 1962; Hoeltke, 1966; Jones, 1972; Mercer, 1970); and that a technology exists which can facilitate special programming by regular teachers (Christopolos, 1973; Sabatino, 1972).

Opponents of mainstreaming feel that the abolition or reduction of special classes is short-sighted and unrealistic. They argue that general educators have enough difficulty with regular students and that the addition of handicapped children will only increase the problems (Turney, 1975).

Regular class teachers themselves are unsure of their abilities to deal with exceptional children and fear that they do not have the curriculum expertise necessary to provide appropriate programs (Zawadzki, 1974).

Recent federal legislation has emphasized that the special class should not be the most desired placement; in fact, "least restrictive environments" should be given primary consideration (Abeson, 1974). Such a placement provides experiences for the handicapped child that are as close to those of normal children as possible. Regardless of professional arguments, it would appear that mainstreaming in a practical sense has become a reality.

An important variable in the success of mainstreaming programs will undoubtedly be the attitudes of regular teachers who are asked to program for handicapped children. Teacher expectations and attitudes have been demonstrated to have effects on student performance in a variety of settings (Brophy & Good, 1974; Grieger, 1971; Palardy, 1969); some evidence exists with regard to teachers' expectancies for handicapped children. Foster, Ysseldyke and Reese (1975) have shown that differential attitudes were related to labels (i.e., MR, ED, LD) assigned to a child. Algozzine, Mercer and Countermine (1976) demonstrated that behaviors were differentially bothersome as a function of the "type" of child (i.e., LD or ED) thought to exhibit the behavior. Special and regular education teachers have been shown to have different tolerances for behaviors commonly exhibited by children thought to be disturbed (Algozzine, in press).

If it can be demonstrated that teachers hold differential attitudes toward mainstreaming exceptional children, then the possibility exists that those attitudes may bias the prognosis for children integrated into "low attitude" rooms. The success or failure of mainstreaming particular types of children could be a function of differential attitudes and expectancies for different handicapping conditions.

The purpose of this study was to determine teacher attitudes toward the mainstreaming of physically handicapped, socially/emotionally disturbed, educable mentally retarded and learning disabled children. It was hypothesized that there would be no differences between regular class teachers' acceptance of children as a function of handicapping conditions and that the development of educational programs for the children would be equal for all handicaps.

Procedure

Subjects. Three hundred and sixty-three teachers from a large Intermediate Unit in central Pennsylvania were contacted to participate in the study. Each was asked to complete a questionnaire developed for this investigation; it requested their opinions about mainstreaming four types of handicapped children. The categories were defined using the current Pennsylvania State Department criteria for learning disabled (LD), socially/emotionally disturbed (SED), physically handicapped (PH), and educable mentally retarded (EMR) children. After each definition, a brief description was given which highlighted its educational characteristics. Seventy-four percent of the teachers returned completed questionnaires ($n = 267$). Approximately ninety percent of the teachers were certified in regular education, thirty-two percent had Master's degrees and less than thirty

percent were teaching or had taught with handicapped children in their room.

Definitions of categories

1. *Learning Disabled (LD)*. Learning disabled pupils are those children who have a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in imperfect ability to listen, think, speak, read, write, spell or do mathematical calculations. Such disorders include such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. This term does not include children who have learning problems which are primarily the result of visual, hearing or motor handicaps, mental retardation, emotional disturbance, or of environmental disadvantage. The child's intellectual potential is average or above.

2. *Socially/Emotionally Disturbed (SED)*. Socially/emotionally disturbed students are those who because of mental illness or psychological stress may exhibit overt behavior deviating from aggressive destruction to morbid withdrawal. They are students of average or potentially average intelligence but are unable to function "normally" or make progress at a rate, and to an extent, commensurate with their abilities.

3. *Physically Handicapped (PH)*. School-aged physically handicapped persons are those who manifest orthopedic and/or other health impairments of sufficient magnitude to limit their classroom accommodation and educational performance.

4. *Educable Mentally Retarded (EMR)*. Educable mentally retarded students are those who are significantly impaired in their adaptive behavior as a result of subaverage general intellectual functioning which originates in the formative years of life and is associated with impairment of one or more of the following areas: learning, maturation, or social adjustment.

Method. The dependent measure was the subject's responses to four sets (i.e., one for each category of handicap) of two questions designed to measure their attitudes toward mainstreaming. The first asked what portion of the exceptional child's education should be offered in the regular room; responses were recorded on a three-point continuum from "all" to "none." The subjects also responded with regard to their ability to provide a meaningful educational program for the handicapped child; a four-choice continuum, from "strongly agree" to "strongly disagree," was utilized to record these attitudes.

Two separate within subjects analyses of variance were performed to determine if the teacher's attitudes were differentially influenced by the four handicapping conditions.

Results

The means, standard deviations and analysis of variance summary table for the subjects' "acceptance" scores for each category of handicapped children are presented in Table 1. Follow-up procedures, using the individual variances and covariances as variance estimates, indicated that the teachers would be more "accepting" of physically handicapped and learning

TABLE 1
MEANS, STANDARD DEVIATIONS AND ANALYSIS OF VARIANCE SUMMARY
TABLE FOR "ACCEPTANCE" SCORES FOR EACH CATEGORY
OF HANDICAPPING CONDITION

Category	PH	LD	SED	EMR
Mean	2.2	1.9	1.7	1.6
Standard Deviation	0.7	0.5	0.7	0.6

Note: Score range = 1-3.

Source	MS	df	F
Between Subjects			
Error	0.524	256	
Within Subjects			
Categories	15.158	3	48.740*
Error	0.311	768	

* $p < .01$

disabled children than they would be of socially/emotionally disturbed or educable mentally retarded youngsters.

Similar results were indicated for the analysis of the teachers' responses to the programming question; the means, standard deviations and analysis of variance summary table for this analysis are presented in Table 2. The results of the follow-up analysis are presented in Table 3; teachers felt more capable of programming for LD and PH children than for those called SED or EMR.

Conclusion

The purpose of this study was to investigate certain attitudes of regular teachers toward the integration of PH, LD, SED, and EMR students into regular classes; it was hypothesized that teacher attitudes would be similar for the different handicapping conditions. This hypothesis was rejected; teachers felt that PH and LD youngsters should receive more services in regular rooms and that they were better able to provide programs for them than for "disturbed" or "retarded" children.

This hierarchy of "acceptability" has been supported by other studies. Tringo (1970) found less "social distance" between nonhandicapped persons and physically handicapped individuals; more between them and mentally retarded persons. Shears and Jensema (1969) suggested that disabilities with the least social stigma were the most acceptable. Algozzine, Mercer and Countermine (1976) have posited that teachers' level of tolerance is a function of the disturbingness of a child's behavior and have shown that behaviors characteristic of LD children are less disturbing than those of SED children.

TABLE 2
MEANS, STANDARD DEVIATIONS AND ANALYSIS OF VARIANCE
SUMMARY TABLE FOR RATED ABILITY TO PROVIDE EDUCATIONAL
PROGRAMS FOR EXCEPTIONAL CHILDREN

Category	PH	LD	SED	EMR
Mean	2.8	2.5	2.2	2.1
Standard Deviation	0.9	0.8	0.7	0.9

Note: Score range = 1-4.

Source	MS	df	F
Between Subjects			
Error	1.352	256	
Within Subjects			
Categories	29.419	3	54.807*
Error	0.537	768	

* $p < .01$

TABLE 3
SUMMARY OF MEAN DIFFERENCES IN TEACHERS' ATTITUDES ABOUT
THEIR ABILITIES TO PROVIDE MEANINGFUL EDUCATIONAL
PROGRAMS FOR HANDICAPPED CHILDREN

EMR	SED	LD	PH
2.1	2.2	2.5	2.8

It would appear that the success of mainstreaming programs could be affected by the attitudes of “receiving” teachers. In-service and pre-service training programs should begin to consider methods of alleviating biases held by classroom teachers. The results of Haring, Stern and Cruickshank’s (1958) study which attempted to alter attitudes provides some direction for these efforts. Their results indicated that teachers’ attitudes did not change as a result of “in-service” training but that those teachers who had “experience” with handicapped children had more positive feelings about them. It would seem that teacher training programs would find more success in having students “work” with exceptional children rather than “learn” about them in classes.

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H. W. HODYSH

The University of Alberta

A Critical Examination of Dewey's Method of Inquiry

A most critical but neglected problem confronting historians of education is the clarification of their methodological assumptions. The question is examined with particular reference to the nature and purpose of John Dewey's genetic or historic method. Contrary to Dewey's position, it is argued that the educational historian's lack of "intellectual control" over data affects the interpretation of the past. Dewey's claim that the genetic and experimental methods as tools of inquiry are identical in their application is explored and, in terms of the educational historian's unique task, questioned. Educational historians would do well to reconsider Dewey's idea of the genetic method but with a recognition of its limitations. (Dr. Hodysh is Associate Professor in the Department of Educational Foundations at The University of Alberta.)

John Dewey identifies the central question of historical inquiry to be, "Upon what grounds are some judgments about a course of past events more entitled to credence than are certain other ones?" (1938, p. 231). That others have attempted to answer this vital question (Barzun & Graff, 1957) in no way detracts from Dewey's innovative effort to see it in terms of the genetic or historic method, a pattern of inquiry that indicates "the manner or process by which anything comes into experienced existence" (Dewey, 1902, p. 109; Ratner, 1950, p. 143). There is evidence to suggest, however, that Dewey's interpretation of the genetic method is not consistent and, in some instances, at variance with the principles of inquiry he puts forth (Murphy, 1939; Reichenbach, 1939). On the one hand, he rejects the Rankean view that the educational historian intellectually reconstructs past events "as they actually happened" (Dewey, 1938, pp. 236-237). On the other hand, he argues that application of the genetic method leads to an understanding of "the exact conditions, and the only conditions which determine a state of affairs" (1902, pp. 108-109; 1916, pp. 66-67). Such an apparent dichotomy reflects an approach to the educational past that would seem to contradict the very nature and purpose of Dewey's own historical method. The problem remains unresolved and open to further investigation.

Historical Judgments and the Method of Inquiry

Like others before him, Dewey conceives history to be “that which happened in the past” and “the intellectual reconstruction of these happenings at a subsequent time” (1938, p. 236; Hodysh, 1974, p. 154). The distinction between an actual and reconstructed past allows the historian of education to decide what significance should be attached to data in a continuum of past, present, and future. The past, Dewey explains, “is of logical necessity the past-of-the-present, and the present is the past-of-a-future-living present.” With the historian controlling the determination of subject-matter by applying a “*direction of movement*,” history of education becomes a cumulative continuity of events “towards stated outcomes” (1938, p. 236, italics in original). Such direction enables the investigator to see the “moral progress and moral order” which the past conceals (Hodysh, 1970, p. 248). In this context, history of education serves an ethical purpose by contributing to “a systematic account of our judgments about conduct, insofar as these estimate it from the standpoint of right or wrong, good or bad” (Dewey & Tufts, 1932, pp. 3-6).

Among Dewey’s most important considerations is the recognition that “*all historical construction is necessarily selective*” for the educational past cannot be reconstructed in its entirety (1938, p. 235, italics in original). This position acknowledges the educational historian’s centrality in determining the nature and direction of events. Though data are first selected by the people “whose past is now being written,” it is the historian who decides what “weight and relevancy” ought to be assigned to those data he chooses to study (1938, p. 236).

Dewey submits that the formation of historical judgments lags behind that of physical judgments, and this he attributes to historians who have failed to make clear “the systematic conceptual structures which they employed in organizing their data to anything like the extent in which physical inquirers expose their conceptual framework” (1938, p. 233). He holds that historical inquiry is no different from any other form of inquiry. It should be approached in terms of the “most effective operation of intelligence” which he identifies as the scientific or experimental method (Dewey, 1931 p. 326; Bhattacharya, 1969). For Dewey, there is an “exact identity between what the experimental method does for our physical knowledge and what the historical method in a narrower sense may do for the spiritual region: the region of conscious values.” In generating water, for example, “we single out the precise and sole conditions which have to be fulfilled that water may present itself as an experienced fact.” He observes that “the experimental method is entitled to rank as the genetic method,” as both are concerned with the way in which anything comes into “experienced existence.” Moreover, history provides “the only available substitute for the isolation and for cumulative recombination of experiment.” The crudeness and simplicity of early periods act as “a substitute for the synthesis of experiment” (1902, pp. 109-113).

If Dewey is correct, then a genetic explanation of a particular state of affairs C_t , occurring at time T and where C_t is the result of a series of occurrences whose initial term is some state of affairs C_o that existed before C_t , involves reference to a description of events $C_o, C_1 \dots C_i, \dots, C_k, C_k', C_k'', \dots, C_t$ (Nagel, 1961, pp. 567-568). In this way a genetic explanation

allows the educational historian to exercise "intellectual control" (Dewey, 1966, p. 228) over his data and provides him with the opportunity to make "warranted assertions" (Dewey, 1938, pp. 154-155) that tentatively confirm or disprove the hypothesis governing his study (Dewey, 1929).

Dewey's idea of "causal linkage" plays a significant part in this genetic process. It acts as a "means of instituting, in connection with determination of other similar linkages, a single unique history." Gross, qualitative occurrences which are "logically, not temporally conjoined" resolve into a definite set of "causal" interactions (Dewey, 1938, pp. 458-459). In order that an indeterminate state of affairs might culminate in a single continuous history, "there is sufficient and necessary ground for taking one event as 'effect' or consequent, and some other as antecedent or 'cause'" (Dewey, 1938, p. 459). This results in a temporal-spatial continuity of "functionally significant" historical events (1925, p. 295) which are based on a selection of particular conditions and guided by a particular "end-in-view" (1938, pp. 460-461). In brief, the historian of education establishes the precise nature of the "cause and effect" process according to his conception of what is significant.

Application of the genetic method is evident in the *Ethics* where Dewey and Tufts inquire into the nature of "group morality" in history (1932, pp. 45-65). On the basis of secondary as well as primary source materials, Dewey and Tufts describe and compare social-historical conditions in primitive societies. Reference to such educational agencies as the family and "primitive court" is made. Historical data are interconnected and then directed in a "causal" sequence. The findings are eventually applied to the solution of ethical problems in politics, education, and family life.

The Limits of Genetic Explanation

It appears that Dewey's historical method rests in part on two explicit assumptions: first, that the simplification of phenomena in history is equivalent to the isolation of phenomena in an experiment; and second, that use of this method assists in the making of ethical judgments which are relevant to the present. This raises the question of whether or not Dewey's historical method satisfies his own criteria of experimental inquiry.

Insight to the question might be had by considering Dewey's distinction between actual and reconstructed events. A physical scientist, for instance, studies phenomena as they occur in their "actual" historical state or "natural" setting. In synthesizing water, he defines and quantifies those variables needed for the completion of the experiment, thereby exerting "intellectual control" over the actual phenomena at hand. This is the goal towards which Dewey's historian strives but is unable to attain. The genetic or experimental method notwithstanding, there is no way in which the historian considers educational events as they actually happen. His data have in part been affected by the conceptual frameworks and selective processes of others. His primary sources are reconstructions of phenomena that are a step further removed from a comparable kind of "actual" data used by his colleague, the physicist. To suggest that a genetic inquiry into *similar* but *unrelated* events in time will necessarily improve the effectiveness of the educational historian's warranted assertions is to disregard the limitations of the process itself. These anomalies will likely remain as

long as Dewey considers experimental inquiry to be the *sine qua non* of historical study (Piatt, 1939, pp. 109-111; Frankena, 1965, pp. 138-139).

Such problems bring into focus a distinction between inquiry in the physical sciences and history. When conducting an experiment, for example, the physical scientist's main concern is to describe and explain "actual" phenomena within the purview of experimental control. He appeals to no immediate end beyond the determination of "the exact conditions, and the only conditions" surrounding an event. The significance of his experiment to social and ethical questions, for example, is ancillary to the primary end. Dewey's educational historian, however, sees the determination of "exact conditions" as subordinate to the "direction of movement towards stated outcomes" envisioned at the start of the inquiry. Might not such an "end-in-view" lead to predetermined goals that are apart from the experimental process and prejudicial to it?

Dewey insists that in the series $Co, Cl \dots, Ci, \dots, Ck, Ck', Ck'', \dots, Ct$, the "earlier terms do not develop the later ones," but rather "constitute elements in a problem which is solved by discovering a continuous process or course" (Dewey, 1902, p. 116). Is it possible, however, to establish a "cause-effect" continuity of development from Co to Ct in terms of an impartial, scientific process, especially when the historian determines the directional movement and specific outcomes as a means of realizing the "moral progress as well as the moral order" which history conceals? In Dewey's historical inquiry into the nature of "authority" and its effect upon the social order (1946, p. 170), events are examined not in order to better understand their importance to the period under study but rather to show how they relate to judgments "of ways to act, of deeds to do, of habits to form, of ends to cultivate." It becomes clear that the historian of education establishes "significant" data for a purpose which is other than that of determining the "only conditions" of a state of affairs. Moreover, it seems difficult to justify the claim that there is an "exact identity" between the genetic and experimental methods.

Implications for Further Research

At the risk of oversimplification, one might distinguish two intellectual currents affecting Dewey's historical theory. The first represents an "evolutionary" perspective that envisions the course of history as a kind of "progressive" continuity of movement towards an "end-in-view." It indicates in part a biological orientation (Passmore, 1957, p. 117) and the tendency to see historical study in service to social and moral ends (Hodysh, 1970, p. 252). The second is an "experimental" framework that identifies historical inquiry with the principles of scientific method and is in keeping with his naturalistic philosophy. These positions are noted throughout Dewey's writings on the theory of history and do not appear to reflect conceptual differences between his earlier and later works. Dewey accepts no one position unequivocally but seeks to develop a unique perspective influenced by a variety of elements (Dykhuizen, 1973). The resulting inconsistencies betray a synthesis which is not fully effected.

Abraham Kaplan tells the story of the tippler searching under a street lamp for his house key which he had lost some distance away. Asked why he

did not look for it where it was dropped, he replied, "Because it's lighter here!" (Kaplan, 1964, p. 11). In some ways, Dewey's approach to the making of historical judgments is analogous in principle to the "tippler's search." It represents a "logical" perspective particularly fitted to the special problems of physics and biology. Perhaps at this time, educational historians might question the value of Dewey's synthesis and his somewhat rigid adherence to the ideals of experimental method, and explore other "logics-in-use" in order to better understand the unique problems confronting the study of the past.

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L. M. BEZEAU

Ontario Institute for Studies in Education

Equality of Educational Opportunity and Inequality of Per Pupil Expenditures

This study examines the extent to which equality has been achieved in per pupil expenditures among census divisions in Ontario. This is done by relating two measures of welfare, personal per capita income and assessment per school-aged person, to per pupil expenditures at the elementary and secondary levels. An inverse relationship was found between these two variables and per pupil expenditures at both levels, indicating that wealth of the area is still an important variable in determining per pupil expenditure. The best economic predictor of per pupil expenditures was proportion of industrial and commercial assessment, though this variable is fiscally neutral because of the percentage equalizing grant plan operating in Ontario. (Dr. Bezeau is Assistant Professor in the Department of Educational Administration at The Ontario Institute for Studies in Education.)

Equality of education has been an important social concern in Ontario for some time. Equality of opportunity can be distinguished from equality of result (Bane, 1975 p. 281) with the latter receiving increasing emphasis through various forms of special and compensatory education. The use of pupil weighting factors in the Ontario grant structure which provides extra money to Boards with special education programs and non-Anglophone students has been directed ostensibly toward greater equality of result. A previous study of the funding of elementary education in Ontario (Armstrong, 1973 p. 11) identified two interpretations of equality, the libertarian interpretation and the egalitarian interpretation. The latter advocates compensation for disadvantages as opposed to mere equality of opportunity. Although both approaches involve redistribution of funds for education, it is generally conceded that the egalitarian approach requires more redistribution than an approach that aims merely for equality of opportunity. To attempt equality of results requires the most massive redistribution. Armstrong (1973 pp. 11-12) states that Ontario is committed to an egalitarian approach without implying that it is attempting to achieve complete equality of result.

Some authors make a distinction between equality and equity. They see equality as an easily measurable mathematical concept. Complete equality among pupils can be achieved if they have equal amounts of the resources that matter. In this study, per pupil expenditure is used as a proxy for more detailed information on resource allocation to pupils. Equity requires that the distribution of resources be fair and just in some sense. This concept clearly depends on important value judgments about what constitutes justice in society. Ideas of equity derive from some general philosophical scheme and may be abstract and difficult to measure. Equality of result, using this distinction, is really a form of equity since it is based on an unequal distribution of resources to achieve a particular view of justice.

A series of surveys (Humphreys, 1972; Humphreys & Rawkins, 1974) examined inequality between urban and rural schools in Ontario. Between 1967 and 1971 many of the services previously available only in urban areas became widely available in both. These included consultants, support personnel, special classes, and reduced class size. The trend toward equality of opportunity was reversed between 1971 and 1973. During that period the situation in rural schools remained stable or worsened, while that in urban schools continued to improve. Humphreys and Rawkins (1974) attribute this to the firmer entrenchment of the special services in urban areas in the face of provincial expenditure ceilings imposed on school boards.

A more recent study (McEwan et al., 1975) commissioned by the Government of Ontario to study educational costs questions the egalitarian motives of the Province after a detailed examination of weighting factors. They conclude that:

In any consideration of weighting factors, it is difficult to escape the conclusion that the criteria for their determination have been developed, at least in part, with the objective of accommodating the higher spending levels already established by a few boards, rather than to meet the respective educational needs of all boards. (McEwan et al., 1975, p. 234)

McEwan's Committee on the Costs of Education felt that the grant provisions as a whole were anti-egalitarian in effect:

The weighting factors, for both grant and expenditure purposes, continue to produce results that are difficult to justify. The differences among boards in the amounts of their expenditures eligible for grant illustrate the situation. A principle of the grant plan is designed to arrive at an equitable rate of grant for a board, based on equalized assessment per weighted pupil. If that principle functions as it should, some considerable equity should be achieved, subject to the inadequacies of assessment practices as we have described them earlier in this Report. But then, to apply the rates of grant calculated on this basis to different amounts of the expenditures by boards distorts the equalizing effects of the applicable rates of grant. So, while there is an attempt to treat boards on an equitable basis, the effect of the application of the total grant weighting factor is to work in the opposite direction. (p. 255)

Although the Committee looked at the grant and expenditure formulae in detail and concluded that they were inequitable, they did not attempt to assess the resulting expenditure distribution by relating it to independent variables. This study filled that gap. It examined the extent to which equality has been achieved in Ontario by examining certain correlates of per pupil expenditure at the elementary and secondary levels.

The Context

The school system of Ontario is divided into elementary and secondary levels on legal and financial bases. Publicly supported separate schools exist at the elementary level for the constitutionally defined religious minority, which is usually Roman Catholic. Where separate schools exist, minority families have the option of supporting and enrolling their children in either school system. At the secondary level, all families support the non-denominational public schools through property taxes, and all children educated at public expense go to public schools. As a result, a public board of education in Ontario has different sets of ratepayers at the elementary and secondary levels. Separate school representatives on the board vote on secondary school matters but not on elementary school matters. Thus a clear line must be drawn between elementary and secondary revenue and expenditures. Some public systems in Ontario have junior high schools (grades 7, 8, and 9) and in these the law requires a detailed breakdown of classes taught at each level by each teacher to determine the correct allocation of salaries. Other expenditures are allocated in a similarly careful manner. The same distinctions are made in schools which are separate at the elementary level and private at the secondary level.

Most public school districts in Ontario are coterminous with the regional municipality, county, or district used for local government purposes. The exceptions are of two types: (1) large cities or boroughs with their own boards and (2) remote areas with large numbers of very small boards, each often operating a single school. The regional municipality, county, and district are also used by Statistics Canada as census divisions for Ontario, a practice that greatly facilitated data collection for this study.

The Sample and Data

The basic unit of analysis is the census division as defined in the 1971 Census of Canada, with some exceptions. Between 1971 and 1974 a number of municipal and school district consolidations took place. Data for the original units were combined to correspond to the new units. These consolidations affected only units with relatively small populations. For the purpose of this study, the most populous census division in Ontario, Metropolitan Toronto, was broken down into its six component municipalities. Metropolitan Toronto contains 27 percent of Ontario's population, making it much too large to be treated as a single case. There are seven school boards in Metropolitan Toronto, one public board for each municipality and a separate board for the entire metropolitan area. Census data were available by municipality. The final sample contained 54 cases (census divisions, etc.) and covered the entire province.

The two dependent variables, elementary and secondary per pupil expenditures for 1974, were weighted means of the corresponding per pupil expenditures for all the boards in the census division operating at the appropriate level. This information was obtained from unpublished sources provided by the Ministry of Education of Ontario and the Metropolitan Toronto Public School Board. The weights used were the number of pupils, which resulted in a mean equal to the total expenditure at each level divided by the total number of pupils at that level. A problem was posed by some

separate boards which operated in two or more census divisions. In these cases their pupils had to be arbitrarily divided between the census divisions before calculation of the weighted mean for the elementary level. In the case of Metropolitan Toronto the number of separate school pupils assumed for each municipality was made proportional to the product of the number of children in school and the number of Roman Catholics in the municipality. Outside of Metropolitan Toronto, the division was based solely on the school age population. Although these methods are arbitrary their effect on the final results is minimal since separate boards spend only seven percent less per pupil than do public elementary boards for Ontario as a whole. Also, the high-spending separate boards tend to be in the same areas as high-spending public boards, so that the public and separate per pupil expenditure figures were close for all cases in the sample.

The population figures are provincially reported ones (Ministry of Treasury, Economics and Intergovernmental Affairs, 1975) for 1974. These include total population and school age population defined as ages five to 19. The income figures were from the 1971 Census of Canada (94-709; 95-751) and are for total income per capita. This is an overall measure of economic welfare that reflects labor force participation and unemployment as well as productivity in the labor force.

Figures on urbanization and population density are also from the Census (92-709; 98-701). Urbanization is expressed as the proportion of persons living in urban areas, which are defined to include:

- (1) incorporated municipalities with a population of 1,000 or over and having the legal status of city, town or village; (2) unincorporated places of 1,000 population or over, having a population density of at least 1,000 per square mile; (3) the urbanized fringe of (1) or (2), if it has a minimum population of 1,000 and a density of at least 1,000 per square mile. [*1000 per square mile is equivalent to 386 per square kilometer*] (12-540, p. 55)

Ontario's population is 80 percent urban but the range of urbanization among census divisions is from zero to 100 percent. The correlation coefficient between urbanization and population density is 0.47, somewhat lower than might be expected. This results from census divisions that have large non-agricultural rural areas, such as the District of Algoma, which combine high urbanization with low population density. The rural agricultural census divisions have lower urbanization ratios and higher population densities. This contrasts with the usual pattern of high urbanization and high population density.

Assessment figures (Ministry of Treasury, 1975) are for 1974 and include all taxable assessment regardless of how it is distributed between the public and separate boards. The figures on the proportion of assessment that is industrial and commercial as opposed to residential and farm is from the same source.

Results

Table 1, which shows the intercorrelations among a selected set of independent variables, reveals some important relationships. The very high correlation between income per capita and urbanization dictated the elimination of one of them, urbanization, from the regressions. A surprising

TABLE 1
PEARSON PRODUCT MOMENT CORRELATION COEFFICIENTS
BETWEEN INDEPENDENT AND DEPENDENT VARIABLES

Variable	EXS	YPR	ASPS	PACIN	PD	LPD	UR
EXE	0.87**	0.46**	0.34*	0.57**	0.66**	0.29	0.55**
EXS		0.33*	0.37*	0.45**	0.62**	0.26	0.40*
YPC			0.54**	0.28	0.58**	0.79**	0.81**
ASPS				-0.09	0.60**	0.54**	0.26
PACIN					0.22	-0.01	0.51**
PD						0.71**	0.47**
LPD							0.61**

* Significance $\leq .01$
** Significance $\leq .001$

Key:

- EXE = Elementary Per Pupil Expenditure in Dollars
- EXS = Secondary Per Pupil Expenditure in Dollars
- YPC = Personal Per Capita Income in Dollars
- ASPS = Assessment in Kilodollars Per Person 5 to 19 years of Age
- PACIN = Industrial and Commercial Proportion of Assessment
- PD = Population Density Per Square Kilometer
- LPD = Logarithm of Population Density
- UR = Proportion of Population in Urban Areas

nonrelationship is that between equalized assessment per school-aged person and the percentage of assessment that is industrial and commercial (-0.09). An examination of the residuals revealed the explanation, two types of municipalities which do not follow the high industry—high assessment pattern. The first of these are the resort areas where summer homes boost assessment without affecting resident population. These rural areas typically have little industry. The second type includes relatively poor northern mining and industrial areas which have low assessment even though a large proportion of it is industrial.

The two dependent variables, elementary and secondary per pupil expenditure, have a joint Pearson product moment correlation coefficient of 0.87, indicating about 75 percent common variance. The standard deviation of elementary per pupil expenditure was 10.4 percent of its mean as compared to a figure of 7.0 percent for the secondary level. Elementary per pupil expenditures are less equally distributed than secondary per pupil expenditures.

The best predictor of both elementary and secondary per pupil expenditure as seen in Table 1 is population density. Additional insight was gained by examining the scattergrams of the natural logarithm of population density on the horizontal axis and per pupil expenditures on the vertical axis. Population density could not be plotted without a transformation because of extreme skewness. The plots exhibited a V-shaped pattern showing that the low spending boards have population densities of 11.0 to 36.6, and that the higher spending boards have population densities between 0.14 and 11.0 and between 36.6 and 73.37. The joint distribution of the

untransformed variable is heteroscedastic with high values of per pupil expenditure being much more predictable than low values. The same conclusions hold for secondary per pupil expenditures.

The economic variable that had the strongest relationship with the dependent variables (Table 1) was "industrial and commercial proportion of assessment." At both levels this was stronger than personal income and assessment per school-aged person. The interpretation of this is not obvious. The proportion of assessment that is industrial and commercial is irrelevant in determining the relationship between the mill rate and per pupil expenditures. Ontario's percentage equalizing grant formula provides equal expenditure per weighted pupil for equal mill rates up to the grant ceiling, independently of other variables. The explanation may be that for some reason persons in industrialized areas are more willing to tax themselves to support education or that taxpayers like to see local industry support education even if it means placing a heavier burden on themselves.

The main purpose of this paper is to examine the relationship between per pupil expenditure and the wealth of an area. Per capita personal income and assessment per school age person are the two independent variables that may be considered measures of the economic well-being of an area. An egalitarian approach to financing ought to compensate areas of lower well-being by providing for higher per pupil expenditures. As Table 2 shows, this is not the case. An increase in annual personal income of 100 dollars is associated with an increase in per pupil expenditures of 7.64 dollars and 6.37 dollars at the elementary and secondary levels respectively. An increase in assessment per school age person of 1,000 dollars is associated with an increase in per pupil expenditure of 2.12 dollars and 2.63 dollars respectively at the elementary and secondary levels. Thus, if these measures of well-being have any general validity, Ontario has achieved neither equality of opportunity nor equality of result.

Additional insight can be gained by examining the results in Table 3 of multiple regressions involving the above two variables and "the proportion of industrial and commercial assessment" as independent variables. The

TABLE 2
REGRESSION RESULTS FOR PER PUPIL EXPENDITURE
AND MEASURES OF ECONOMIC WELL-BEING

Variables		Additive Constant	Regression Coefficients		Correlation Coefficient
Dependent	Independent		B	β	
EXE	YPC	574.95	0.0764	0.457	0.46
EXE	ASPS	719.81	2.1213	0.341	0.34
EXS	YPC	1167.56	0.0637	0.330	0.33
EXS	ASPS	1262.55	2.6314	0.366	0.37

Key:
EXE = Elementary Per Pupil Expenditure in Dollars
EXS = Secondary Per Pupil Expenditure in Dollars
YPC = Personal Per Capita Income in Dollars
ASPS = Assessment in Kilodollars Per Person 5 to 19 Years

TABLE 3
MULTIPLE REGRESSIONS OF ELEMENTARY AND SECONDARY
PER PUPIL EXPENDITURE WITH A SELECTED SET OF
INDEPENDENT VARIABLES

Independent Variable	Per Pupil Expenditure in Dollars				
	Multiple R	R ²	R ² Change	B	β
<u>Elementary</u>					
Personal Per Capita Income in Dollars	0.46	0.21	0.21	0.02039	0.12196
Assessment in Kilodollars Per Person 5 to 19 Years	0.47	0.22	0.01	2.01684	0.32429
Industrial and Commercial Proportion of Assessment	0.70	0.48	0.26	418.58399	0.56064
Constant Term	--	--	--	535.45250	--
<u>Secondary</u>					
Personal Per Capita Income in Dollars	0.33	0.11	0.11	-0.00947	-0.04903
Assessment in Kilodollars Per Person 5 to 19 Years	0.40	0.16	0.05	3.13807	0.43666
Industrial and Commercial Proportion of Assessment	0.61	0.37	0.21	432.27045	0.50105
Constant Term	--	--	--	1137.03737	--

elementary school results show that assessment per school age person has little effect beyond that of per capita income. But the proportion of commercial and industrial assessment has a strong independent variance contribution. At the secondary level, assessment has a stronger effect but here again, the proportion of industrial and commercial assessment has a very strong and independent effect on the dependent variable.

Conclusions

The results of comparing two measures of the economic welfare of census divisions with per pupil expenditures support the conclusions of The Committee on the Costs of Education; expenditure patterns in Ontario appear to favour neither equality of opportunity nor equality of result. The wealthier census divisions as measured by either personal per capita income or by assessment per school age person have higher per pupil expenditures at both the elementary and secondary levels. This study confirms the resource advantage enjoyed by urban areas as reported in another context by Humphreys and Rawkins (1974). The pattern reported here is undoubtedly the prevailing one in North American provinces and states. In spite of legislation, court decisions, and apparently favourable public sentiment, equality of opportunity has proven to be an elusive goal. No doubt, considerable progress has been made in Ontario and elsewhere in the past decade or two, but the old problems still exist. Equality of result which would seem to require an even more radical redistribution of revenue is still

farther from achievement. Indeed, equality of result may be simply impossible given the tremendous range of individual variation among pupils.

As indicated by the quotations from The Committee on the Costs of Education, the culprit in Ontario may be the formula used to distribute provincial funds to school boards, and especially the system of pupil weighting which is used to describe need. This is an area that needs considerably more research, both from the points of view of equality of opportunity and that of resource allocation.

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J. C. POWELL

University of Windsor

D. J. COTTRELL

Workmen's Compensation Board

and

MARGARET LEVER

Board of Education, Windsor

Schools I Would Like to See: An Opinion Survey Instrument With Interesting Possibilities

Following a suggestion by Carlton (1974), and using as a starting point the goals for education reported by Spears (1973), a 24-item opinion survey was developed. The survey requires the selection of the four most important and the four least important goals from the list. A complex scoring procedure derives seven largely independent scales from these eight responses. Although the list of goals is not exhaustive, it has been found that this set of goals and the underlying construct upon which they were developed form a necessary and sufficient set to satisfactorily characterize the general approach to education among most populations. Reliabilities are high enough for some use in individual attitude assessment on most of the scales. Among other findings, a four-level Maslow-like hierarchy was detected to form one scale. This scale did not validate as a construct with Shostrom's POI (1966). Some examples of the use of the opinionnaire are reported and several suggestions for possible research use are made. (Dr. Powell is Associate Professor of Educational Psychology at the University of Windsor, Mr. Cottrell is a vocational rehabilitation counsellor for the Ontario Workmen's Compensation Board in Toronto, and Ms. Lever is Computer Liaison Officer for the Board of Education in Windsor.)

Carlton (1974) reviewed the literature on schooling and reported seven different images commonly held by theorists in education: (1) The Familial Model, (2) The Political Model, (3) The Economic Model, (4) The Religious Model, (5) The Collegial Model, (6) The Custodial Model, and (7) The Community Model.

This paper reports the development of an instrument designed to empirically validate these seven models and an additional one, (8) The Humanizing Model, as a necessary and largely sufficient set of approaches to education to accommodate most people's views of what purposes education should serve. These eight models are first described in summary form and the procedure used to develop the instrument and its general characteristics is discussed. Following this, the results of initial attempts at determining the validity and the reliability are presented and a brief overview of some of the research outcomes is given. The paper concludes with a synopsis of the effectiveness of the instrument to date and some suggestions for research and other uses for which it might be employed.

Description of Models

Consideration is given to these models in the order Carlton (1974) discusses them. The description of each model, as follows, is abridged from Carlton's discussion and is then summarized in terms of goal expectations.

1. *The Familial Model.* In this model, "custom and consensus are reinforced through consistency of socialization across home and school: change may be valued or even encouraged, but only along lines which amplify rather than challenge the established order" (p. 62). A person supporting this model would be expected to favour an emphasis upon extrinsic rather than intrinsic motivation, to encourage social as contrasted with individual responsibility, and to encourage learning for use in society.

2. *The Political Model.* "The political school emphasized its linkages with all levels of government, . . . [e]ffective political socialization, . . . [a]ppropriately edited curricula . . . [to] enhance the adaptive and reproductive functions of the school, . . . [without] challenge [to] the rightness of established order" (p. 64). The person who supports this political point of view would be expected to favour emphasis upon extrinsic motivation in terms of one's responsibility to the state, the development of an informed citizenry, and the suppression of personal needs and goals in favour of collective needs and goals.

3. *The Economic Model.* In this model, "economic norms govern the enterprise . . . schools are drawn into competition, . . . differentiation of the training [and the products] offered" (p. 66). In a phrase, students are sensitized to their market value. The person who favours this model for schooling would expect the school to focus upon the competitive development of vocational competence, the pursuit of economic rewards, and personal development through self-initiative.

4. *The Religious Model.* A school in this model "has behind [it] the full weight of spiritual and ecclesiastical authority. . . . Linkage to the church is . . . immediate and direct. . . . [Such a school is] protective of the status quo, . . . [and] inner directed" (pp. 67, 68). The person who favours such an approach to schooling would place a strong emphasis upon moral and ethical or spiritual values in an attempt to heighten self-criticism for the development of inner directed (intrinsic) motivation. An emphasis upon traditional learning and upon acquiescence to persons in authority would also be evident.

5. *The Collegial Model.* "The collegial school is client-centred, but . . .

ensures the regeneration of the elite. . . . The authority system . . . is hierarchial by expertise . . . [and] the education of recruits to a discipline is regarded as . . . vital” (pp. 69, 70). Thus the adherent to this approach to schooling would be expected to favour interpersonal competition, academic excellence, and individual initiative tempered by logic and supported by evidence.

6. *The Custodial Model*. “Entry to a custodial school is [prescribed] . . . teacher-student relationships take on much of the character of staff-inmate interactions . . . reinforced psychologically by depersonalized tactics . . . behavioral control [and] humiliation . . . [and] the continued denial of personal competency through external regulation. [This assumed incompetency] functions to legitimate the need for custody” (p. 71). The supporter of the custodial approach, viewing the learner as incompetent and education as therapeutic, would be expected to favour strong discipline, focus upon basic intellectual skills, and an emphasis upon the responsibility of the individual for his or her own behaviour.

7. *The Community Model*. In this model, “[E]ducational aims are not set by a single group or organization; rather, each pursues his own goals in conflict or cooperation with others similarly self-directed . . . objectives are . . . set by those who pursue them” (pp. 72, 73). A person who would support this model would be expected to favour the development of collaborative action for the common good.

When examining these seven models in the light of the descriptions Carlton gave and the secondary comments provided here, it became apparent that a three-dimensional system could be used to organize all seven models into a single system. Table 1 gives this organization.

This system organizes these models in the following dimensions:

I. *Approach to Motivation* which refers to whether the model sees the learner’s rewards for progress as coming from within (Intrinsic) or from some external source (Extrinsic).

TABLE 1
A THREE-DIMENSIONAL SYSTEM ACCOMMODATING
CARLTON’S MODELS

School Model	Dimensions		
	I Approach to Motivation	II Approach to Information	III Approach to Authority
1. Familial	Extrinsic	Doing	Consensus
2. Political	Extrinsic	Knowing	Consensus
3. Economic	Extrinsic	Doing	Individual
4. Religious	Intrinsic	Knowing	Consensus
5. Collegial	Intrinsic	Knowing	Individual
6. Custodial	Extrinsic	Knowing	Individual
7. Community	Intrinsic	Doing	Consensus
8. Humanizing (?)	Intrinsic	Doing	Individual

II. *Approach to Information* which refers to whether or not information is taught for its intrinsic value (Knowing) or its utilitarian value (Doing).

III. *Approach to Authority* which refers to whether or not the ultimate authority for the right to act is vested in society, tradition or other external consensus-based foci (Consensus), or within the personal responsibility of the individual to operate in society with the authority of personal competence and conviction backed by reason and evidence (Individual).

Once these seven models were established within this framework, it became evident that an eighth model was needed to complete the system. The missing model was intrinsically oriented in the Motivation dimension, action oriented in the Information dimension, and personal responsibility oriented in the Authority dimension. Recent literature concerning attempts to “humanize” the schools would seem to reflect these characteristics, thus the suggestion for the name of the eighth model:

8. *The Humanizing Model*. The person who supports this model would be expected to favour educational goals which advocate the development of individual self-competitive initiative with a focus upon the individual’s responsibility to deliver a high level of personal service to others.

Viewed from this perspective, it seems reasonable to suggest that Carlton was rather hard on the Custodial Model, and that each of these models have a functional value in the appropriate circumstances. Criticism of any model may arise philosophically from any person holding an alternative view, or pragmatically from the inappropriate application of that model.

At this point, Table 1 may be regarded as a hypothetical construct with respect to the goals for education. It captures some, but not all, of the major conflicting points of view held concerning the purposes of schooling. The authors, intrigued and challenged by this construct, decided to test its viability empirically.

TABLE 2
LIST OF GOALS FROM KAPPAN SURVEY^a

1. Develop skills of reading, writing, speaking and listening.
2. Develop pride in work and a feeling of self-worth.
3. Develop good character and self-respect.
4. Develop a desire for learning now and in the future.
5. Learn to respect and get along with people with whom we live and work.
6. Learn how to examine and use information.
7. Gain a general education.
8. Learn how to be a good citizen.
9. Learn about and try to understand the changes that take place in the world
10. Understand and practice democratic ideas and ideals.
11. Learn how to respect and get along with people who think, dress and act differently.
12. Understand and practice the skills of family living.
13. Gain information needed to make job selections.
14. Learn how to be a good manager of money, property and resources.
15. Practice and understand the ideas of health and safety.
16. Develop skill to enter a specific field of work.
17. Learn how to use leisure time.
18. Appreciate culture and beauty in the world.

^a Spears (1973)

Design of the Opinion Survey

There are many lists of educational goals in the literature, but Spears' (1973) report of the goals questionnaire listing 18 such objectives, circulated among 1,020 Kappans was of particular interest because so many of them could be fitted into the same models as those presented in Table 1.

To complete a list of goals which had one representative for each model in each of the three dimensions would require 24 goals, so that Spears' list was nearly enough. Table 2 gives the lead statements of each of the 18 goals in Spears' list. The statements circulated were actually more elaborate than this.

For present purposes, consensus among several people as to the placement of each of these goals was used, and six more goals, designed to fill the empty spaces with statements appropriate to the model and dimension, were added.

The initial validation attempt revealed that the three R's goal (No. 1) was rated first by nearly everyone, reducing the discriminating power of all items. Two other goals were correlated with others in the list implying that these two were not identifying unique components. These three were replaced so that the complete list ultimately contained 15 from Spears, and

TABLE 3
GOALS LIST FROM FINAL VERSION OF
"SCHOOLS I WOULD LIKE TO SEE"

1. Develop a capacity for action based on knowledge.	13. Develop ability to trust our own judgement.
2. Develop a pride in our work and in our status in life.	14. Develop skills for innovation.
3. Develop a sense of group solidarity.	15. Learn to manage money and other resources effectively.
4. Learn to respect and get along with others.	16. Understand and practice ideas of health and safety.
5. Develop skills for continued learning.	17. Learn to cooperate with people holding viewpoints which differ from ours.
6. Learn how to manage information.	18. Appreciate culture and beauty.
7. Develop skills of self-exploration.	19. Develop self-initiative.
8. Learn the rewards of good citizenship.	20. Develop an abiding set of spiritual and moral values.
9. Learn to use leisure time effectively.	21. Recognize and accommodate the differing needs of others.
10. Understand the changes in the world.	22. Accept our own short-comings.
11. Understand and practice democratic principles.	23. Learn to accept the authority of people in positions of responsibility.
12. Understand and practice family living skills.	24. Learn about and understand the interdependence of people.

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nine new statements of goals. Several of the statements were slightly reworded to accommodate these construct placements.

Having everyone rank order all the goals (as done in the Spears report) proved to be time-consuming and of low test-retest reliability. Alternatively it appeared that support for one pole of any dimension suggested the rejection of the opposite, implying a forced choice procedure. If these goals represented a continuum, then the highest and lowest goals chosen from this set might be sufficiently representative of a person's value to give an adequate picture of the views of education held by that person.

The choice of four high and four low goals from the total set proved to be the most reliable (in a test-retest sense). Three, five, and six alternatives were also tried but all had lower reliabilities, six being the lowest. The rank order with the high or low choices proved to be less reliable than the simpler "most important" and "least important" designations. Four at each end out of 24 represented greater removal than one standard deviation from the mean.

The final version of the instrument was composed of the 24 goals for education listed in Table 3. The title given the list was, "Schools I Would Like to See" and the respondent chose eight of these: four most important and four least important as seen by him. The instrument took less than 10 minutes to administer and mark sense sheets were easily used.

Validation Procedures

Several forms of validity were considered, the first being content validity. All were goals for education, but there was the possibility that two or more of the respondents saw them as so similar that they did not discriminate the entire model. To resolve this issue, a principal components analysis procedure was used ($N = 242$) to determine the independence of each goal. None of the goals correlated significantly and the lowest loading for any item upon its own component was satisfactorily high (+.63); most were .80 or higher.

The second form considered was concurrent validity. To obtain this validity, the 15 goals which overlapped with Spears' list were rank ordered by assigning +1 for "most," +5 for middle (unselected) and +9 for "least," on the basis of the average rank assigned. This rank order was then correlated with the rank order found by Spears. This correlation was very high ($r = .95$). This time the sample size was larger ($N = 450$). The single major departure was the goal relating to "democratic principles" (Table 3, No. 11). This was seventh out of the 15 from Spears' results, and eleventh out of 15 here. Since Spears reported a survey in the United States and the sample used here was of university students in Canada, this difference may well be a systematic difference arising from the characteristics of the two populations. It was gratifying to find such a simple instrument would be so sensitive to differential effects.

The third validity considered was construct validity. The first concern was to determine whether or not the three assumed dimensions would be found among these data. The cluster analysis procedure in the BMD package (which is related to Guttman's 1944 *Simplex*) was used. The diameter algorithm in this procedure produced three eight-member clusters

which, except for the misplacement of six alternatives, recapitulated these three dimensions precisely. These six items were reclassified on the basis of Table 1 by exchanging them to fit the hypothesized pattern more exactly. One pair was exchanged between two dimensions and the other two pairs were exchanged within each of two of the dimensions, exchanging polarity. The other two algorithms (maximizing and minimizing) were also applied to these data and two new scales were produced by these procedures.

IV. *Approach to People*. The maximizing algorithm produced two clusters of 12 members each. One contained goals mostly people- and self-oriented. The other 12 were things- and ideas-oriented. Because of this polarity, this scale was called Approach to People (People-Things). A few items in this scale seemed oddly out of place. For instance, the "groups solidity" item (Table 3, No. 3) appeared in the "Things" pole. Attempting to change them had a devastating effect upon reliability. An interesting research topic would be to explore the implications of these peculiarities.

V. *Approach to Development*. The minimizing algorithm produced three clusters of approximately six items, with each of the others standing by itself.

Examination of the item components of these clusters suggested a four-part scale reminiscent of Maslow's (1968) hierarchy:

Level 1. Relating world to self. These goals suggest a tendency to an egocentric, self-protective approach to education. (Example: Develop skills of self-exploration.)

Level 2. Relating self to world. These goals suggest a tendency for an outward looking view of education constrained by rather short temporal and special frameworks. (Example: Learn the rewards of good citizenship.)

Level 3. Competent functioning. These goals suggest a tendency toward an inward self-critical approach leading to an outward stress on the competitive development of competence. (Example: Develop skills for continued learning.)

Level 4. Mediative outreach. These goals seem to suggest a tendency toward attempts of the individual, on a self-competitive basis, to extend oneself beyond oneself. (Example: Develop skills for innovation.)

The poles seemed to be Self-protection and Self-development.

Scale IV added a fourth area in which controversy has occurred (the people-things dichotomy) and scale V added a possibility of studying Maslow's theories in an educational context.

VI. *School Model Supported*. These two new scales proved helpful in an additional approach to construct validity which was attempted. In this procedure, the three "most important" choices representative of each school model were used as a starting point. The most common fourth choice found to go with at least two of these three was taken as expected choice number four. By using consensus among a group of raters as to which three alternatives a supporter of each model would be most likely to reject, and the most common rejection not in this list, four "least important" choices for each model were also assigned. In this manner a unique "ideal" profile was obtained for each model. These "ideal" profiles were scored as though they were actual selections produced by someone who had responded to the instrument.

TABLE 4
COMPARISON BETWEEN EXPECTED AND OBSERVED
“IDEAL” VALUES OF THE CONSTRUCT

School Model	Expected Dimension Sign			Observed Dimension Sign			Proportion of occurrence (N = 1423)
	I	II	III	I	II	III	
1. Familial	-	+	-	-2	+2	-2	.03
2. Political	-	-	-	-3	-2	-3	.04
3. Economic	-	+	+	-2	+1	+3	.12
4. Religious	+	-	-	+1	-2	-1	.07
5. Collegial	+	-	+	+3	-1	+2	.13
6. Custodial	-	-	+	-2	-1	+3	.03
7. Community	+	+	-	+2	0	-2	.08
8. Humanizing	+	+	+	+3	+2	+3	.20
9. Indeterminate	?	?	?	?	?	?	.30

1.00

With the scores for the first three dimensions in hand, a comparison could be made from these scores with the expected signs of the scores from Table 1 in the original construct. For scaling purposes, Extrinsic, Knowing, and Consensus poles were taken as negative.

In Table 4 only the Knowing-Doing dimension for the Community Model does not agree with the construct. Twenty-three out of 24 (96 percent) fitted the construct. The original hypothetical system seems to be strongly supported by this procedure, as these eight categories seem to form a necessary set for describing any population.

To establish whether or not this construct containing these eight models forms a sufficient set, 1,423 high school students were scored using a profile matching procedure which involved classifying the respondent as supporting a particular school model. Three or more choices had to agree with the “ideal.” Preference was given to the “most important” set in an ambiguous case. If the ambiguity remained or if less than three could be matched, the person was included in a ninth “undetermined” group. For the classification system to be sufficient, 40 percent or less should be in the undetermined group. This percentage is derived from the fact that a three-dimensional set with three levels rather than two would have 27 categories rather than eight. Thus, a larger number of undetermined respondents would suggest that the system was insufficient to describe any population. Table 4 also gives the validating sample results. There is 30 percent in the “undetermined” category. In no case within several studies has there been more than 40 percent undetermined. Hence, the construct would seem to be supported as “sufficient.”

This profile matching supplied a sixth scale (this time a nominal scale) for the instrument which identifies which of the eight models the respondent would seem to support.

VII. *Approach to Education*. A seventh scale was also developed. The procedure in this case was to plot the “ideal” profiles on their scores for scales IV and V on a grid. The principal diagonal (through quadrants I and III) was drawn and the distance from the origin of the orthogonal projection of these points to the diagonal was determined. This gave a scale value for each school model on a dimension which has a *people-things* relationship in one direction and a *self-development, self-protection* relationship in the other. Scale VII, because of the concepts it related, was classified as an “Approach to Education” dimension with poles “Openness” and “Closedness.” The dimension gives one possible operational definition of Openness in education, making possible an alternative empirical approach to yet another controversial area in education. The various school models can be defined on the scale in accordance with their “degree of openness” with a *people to self-development* orientation being “open” and *things to self-protection* orientation being “closed” (liberated-alienated, if you prefer). To get a score for respondents, the orthogonal projection of their plotted position on scales IV and V is averaged with the value of the scale score for the “ideal” school model with which they were identified. Those in the undetermined groups were given an “ideal” score of zero. This latter value does not affect the sign of the projected value, only its magnitude. A reasonable approach for people who are “on the fence,” so to speak.

Table 5 shows the “ideal” scores for each model in scales IV, V, and VII, half the models closed and half open, with scale V being the most influential. It is not surprising to find Custodial and Religious models Closed nor Economic, Familial, Humanizing and Collegial models open. To find the Community models closed seems strange in the light of all the favourable publicity it has received. To find the Political model the most closed of all, though unexpected, would seem to be both reasonable and enlightening. Since the typical teacher tends to be nonpolitical, the finding

TABLE 5
“IDEAL” SCORES FOR THE EIGHT SCHOOL MODELS
ON SCALES IV, V, AND VII^a

School Model (VI)	Scales		
	IV	V	VII
1. Political	-4	-3	-5
2. Custodial	-4	-2	-4
3. Community	-2	-1	-2
4. Religious	0	-2	-1
5. Economic	0	+1	+1
6. Familial	+6	+1	+5
7. Humanizing	+4	+3	(+5) +6 ^b
8. Collegial	+2	+9	+8

^a School models are arranged in order of their values on scale VII.

^b Humanizing was given a +6 value to distinguish it from the Familial Model in the scoring program. This choice was made because all scale values were positive for the Humanizing Model and not for the Familial Model.

that a sample of 242 teacher trainees tended to be open and contained no adherents of the Political model among them is not surprising.

Thus, in a construct validity basis, the instrument appears to make sense. Further evidence in support of the construct validity of particular scales will be reported later.

Predictive validities have yet to be examined although studies are in progress in this latter area.

Reliability

With respect to the reliability of the test, once again several approaches were used. First, the principal components analysis accounted for .84 of the variance which suggests a high internal consistency. Second, test-retest intercorrelations were obtained, collected from several administrations with different scoring procedures. The highest reliabilities were found under the following conditions:

1. Scales I, II, and III were rearranged to fit the *a posteriori* cluster analysis pattern.
2. Scale IV was also most reliable as found in the cluster analysis. Exchanges of alternatives which seemed logically to be out of place (such as Group Solidarity among the Things Oriented) destroyed the correlation.
3. Scaling Level 1, as -2 and Level 4 as +2 in dimension V improved the reliability of that dimension.
4. Choosing the four most and four least important gave the highest test-retest reliabilities. Either more or fewer alternatives in these two sets proved less reliable. Also, treating *most* and *least* as single categories proved more reliable than using rank ordering within these categories.
5. Since scale VI is a nominal scale, the proportions of equivalent classification from one administration to another was used as a variance estimate, the square root being the reliability estimate.
6. An alternative form involving easier language for administration to younger children is under development; alternate form reliabilities will be available at a later date.

The results of the best reliability estimates ($N = 16$) are given in Table 6.

It should be remembered that the first three dimensions accommodate only eight alternatives each. Since the respondent chooses only eight, these scales are based upon an average of $2\frac{2}{3}$ responses in each scale. To get the overall stability for these three scales, the Spearman Brown formula was applied to the geometric mean of the three reliabilities. This procedure is the origin of the .76 composite value. As indicated in Table 6, the reliability of scale VI is not a correlation. Sixty-nine percent (11 out of 16) respondents reclassified into the same model on the second administration. Since the square root of .69 is .83, this figure is reported.

Since scale VII is a composite scale of all other scales, its highest possible value would be the product of the three primary components used to make it the composite of scales I, II, and III along with scale IV and V. This expectation is met exactly ($.76 \times .81 \times .78 = .48$).

Table 7 gives the intercorrelations between the seven scales ($N = 24$). Only three correlations are significantly different from zero, two of them in

TABLE 6
TEST-RETEST RELIABILITIES (N = 16)

Dimension		Composites
I	.55	.76
II	.53	
III	.48	
IV	.81	
V	.78	.48 (Expected)
VI	.83 ^a	
VII	.48	

^a Not a correlation

TABLE 7
INTERCORRELATION AMONG THE SEVEN SCALES IN INSTRUMENT

Scales	Scales					
	II	III	IV	V	VI	VII
I	.13	.06	.02	-.07	<u>.43^a</u>	.34
II		-.19	.27	.13	-.15	.02
III			-.34	-.35	.11	-.28
IV				-.11	.18	<u>.54</u>
V					-.33	.24
VI						<u>.73</u>

^a Underlined correlations are significantly different from zero.

scale VI. The correlation of .73 between scale VI and scale VII can be explained in that 50 percent of the value assigned to scale VI is used to produce scale VII. Aside from this, scale IV also contributes significantly to scale VII, suggesting that the people-things orientation is the most potent determinant of Openness or Closedness. This is a pattern which makes sense.

The other significant correlation, scale I (Motivation) with scale VI (School Model) suggests that Closed School Models tend to rely upon Extrinsic motivation and Open School Models tend to encourage Intrinsic motivation. This observation is not only sensible, but adds fuel to the controversy over the use of Behavior Modification procedures. These procedures stress Extrinsic motivation which is probably entirely appropriate in a therapeutic (Custodial) setting and by the transcendence of the State over the individual Political Setting. The relationship of Extrinsic motivation to the Community and Religious settings is uncertain. Both favour Intrinsic motivation in the model. Also, both the Economic and

Familial models appear to support Extrinsic motivation (money and family name respectively). Only 18 percent of the variance is involved. One cannot overgeneralize, but the observation is intriguing and could bear further investigation.

Because of the dependency relationship between scales VI and VII, these two scales should be interpreted separately.

Details of the scoring procedure are available in Powell (1975). The administration of this opinionnaire is quick and easy. Scoring, however, is too complex for convenient hand scoring in any quantity. A computer scoring program is available.

Application Studies

The discussion which follows considers the validity and reliability data first. Then the results of the application of scale VI (the eight models) to several different groups are discussed. Third, the implications of using combinations of the six other scales are also considered.

Basically, four different studies are considered. These involve (i) about 900 students using a test-retest administration in a college of education and subgroupings thereof; (ii) about 70 teachers and 1,400 students in a secondary school involving a single administration; (iii) all staff members in a residential school for disturbed adolescent girls, and (iv) a group of 24 adults who took the Personal Orientation Inventory (POI) (Shostrom, 1966).

Implications of Validity and Reliability

The validity studies are primarily of a construct nature and the general construct seems to be supported. The reliabilities are high for a procedure which requires only eight responses and, in general, are adequate. All scales except V and VI essentially make bipolar distinctions and the reliabilities are sufficiently high to use this instrument on an individual basis for such distinctions. Scale V makes distinctions among four levels and has a reliability sufficiently high that group distinctions can be made in this many levels. Individual distinctions are less certain. Scale VI is not reliable enough to be certain of group distinctions for 9 categories (including an undetermined category). However, the method used for obtaining reliability estimates for nominal scales is not very powerful. Conclusions drawn from using scale VI should be considered in the light of their reasonableness as well as their stability. Scale VI should be used independently of other scales because of the fact that it significantly correlates with scales I and VII and may contaminate the results if used with these two for interpretive purposes.

Interpretations from Scale VI

The validation studies make it clear that these eight school models form a necessary and sufficient set of expectation typologies to classify most populations. Population differences are interesting; geography teachers are least definable by model, and religious studies teachers are most definable in one high school. The majority of the latter adhere to the Religious model. An overall reduction in the proportion of respondents not defined may occur with increasing teaching experience. High school students show no such phenomenon with age. Female students choose goals which place them most

frequently in the Humanizing Model. Male students show no single tendency toward preference.

Different occupational groups tend to display differential model preferences. Social workers, for instance, seem to favour the Collegial model, whereas child care workers in the same residential school for girls favour, in general, the Custodial model (Bolos, 1975). The girls in the school expressed more favourable relationships with the child care workers than with the social workers. The residents were not given the SCHOOLS survey for political reasons. These findings in aggregate attest to the validity of the Carlton-Powell system and give some hints as to its usefulness.

Interpretations Based on Other Scales

In general, systematic differential effects can be found in the educational process when this instrument is used. These effects may be used as indirect evidence for the effectiveness of specific programmes.

When used on a longitudinal basis, changes in attitudes follow logically from systematic characteristics of courses and/or programs. For instance, if a teacher training program gives considerable theory but fails to supply a large amount of direct practice in applying this theory, then student teachers become significantly more self-protective (scale V) and closed (scale VII) across their training year. Alternatively, to get a significant Openness shift, the combination of theory, practice in simulation, practice in the field plus specific training in observation and testing techniques is needed. Omitting any of these four components from the program maintains the trend, but makes the change not statistically significant. This combination of four elements is not sufficient by itself to make these student teachers significantly more self-development oriented (scale V) although the trend is evident (Powell, 1976). What is needed in the latter case to produce such a change is not yet known. The trend from the procedures reported for scale V suggests that considerable exploratory involvement in the field may be necessary. Other scales change significantly or show trends that also support the apparent necessity of a multidimensional approach to education in order to produce significant effects.

Where cross-sectional studies are concerned, many interesting findings emerge. Students in high school generally move (on scale V) from self-protection (about 2/3 of grade 9) to self-development orientation (about 2/3 of grade 12). Since both theory and practice are needed for self-developmental orientation to occur, it would seem that most grade 8 students are too young to be expected to make future-oriented decisions. If such decisions are to be made by grade 8 pupils, as is Ontario practice, considerable training and practice in making future-oriented decisions will have to be added to the elementary school program. It is not known for certain how much of this self-development shift is a maturational or a drop-out phenomenon. There are no grade 9 students in level 4 on scale V and about 20 percent of the grade 12 students are at this level. The exact opposite occurs with level 1. However, the decline in level 1 could be from attenuation. A longitudinal study would be necessary to determine these relationships.

Students who opt for work in open areas involving independent study and/or interactive approaches tend to be more open (scale VII) than other

students. These differences become significant for those who are involved in both independent study and interactive study programs. It is not known if this openness is a product of the choice factor or of a learning factor. A longitudinal study is necessary in this case, as well. Many other interesting findings have emerged from the cross-sectional study of the secondary school and will be reported separately.

Although there are similarities between the apparent pattern of scale V (Self-protection; Self-development) and Maslow's hierarchy of needs, this scale seems to be measuring something quite different from the self-actualization measure claimed for Shostrom's (1966) POI. More than half of the POI scales correlate positively with scale III (Approach to Authority). Since the positive end of the scale is toward independent action, clearly many scales measure this aspect of attitude. Scale VI (School Model) correlates curvilinearly with the Self-Actualizing Values scale on the POI. The POI, therefore, did not seem to discriminate between self-initiators who are manipulative in intent (Political, Custodial) and those who are facilitative in intent (Collegial, Humanizing). Scale V did not relate to any part of the POI in a manner which supported the construct validity of either instrument. Thus, work with this present instrument seems to support Maslow's general concept of a hierarchy of needs but not Shostrom's operationalization of the concept. This hierarchy seems to be related to the environmental orientation of the learner so far as the results of SCHOOLS is concerned and would seem to be more complex than the POI measures. Other interesting negative and curvilinear relationships were found (Werner & Powell, 1976) which support this last conclusion or, alternatively, challenge the construct validity of SCHOOLS or the precise definition of Maslow's construct depending upon how the data is interpreted. More research in this area is needed to clarify these issues.

Conclusions

The development of an instrument, SCHOOLS I WOULD LIKE TO SEE, to test the validity of a construct derived from Carlton's (1974) seven Popular Images of the Schools would seem to have been accomplished with a reasonable degree of success. The construct seems to be supported to a point where it is probably valid and involves a necessary and sufficient set of categories (with one addition) for the reasonable classification of most populations. The overall construct may give some interesting insights into how the schools might be functioning.

Several attempts at using the instrument produced interesting results, one being that significant differential effects among educational programs have been found in all cases where these effects could be expected. These effects also occurred in directions which make sense with respect to the nature and the structure of these programs. Since differential effects in educational research have rarely been found consistently, the instrument would seem to have promise.

Attempts to confirm the appearance of Maslow's hierarchy in scale V failed to support the construct validity of SCHOOLS or the construct validity of the POI or of the manner in which Maslow describes his hierarchy, whichever point of view one wishes to take. Scale V, however,

seems to represent a genuine phenomenon, developmentally and instructionally related. Further research is required to establish the parameters operating in this area. One possible explanation for these negative results arises from the observation that scale V would seem to measure a process, whereas Maslow's self-actualized individual and the POI derived from it would seem to be defining a state of existence. Perhaps states and processes are independent.

The observations give rise to other questions. For instance, do students who do best in a particular class, subject, or program hold views of what a school should be doing similar to those of the teachers involved? Are there particular points of view held by student which predispose them to conflict within the school; to absenteeism; to voluntary or involuntary withdrawal? Are there particular approaches to education which are more suitable for students with particular attitudes? Are there teaching or counselling procedures which can be used to change the attitudes of students from the present attitudes held by disruptive students to attitudes which are more productive toward harmony and toward quality achievement?

Are some of these eight approaches to education more useful than others, or does each model have a specific (definable) place in the educative process? Are there particular teacher attitudes which are counter-productive to effective education in a general sense? In a particular setting sense?

Concerning the school and the community: is the school giving the community the kind of education seen as necessary or desirable by the community being served? Are the conflicts between the school and the community, at least in part, a product of differing perceptions of the role the school should play? Should educators assess and try to meet community attitudes, should they try to influence community opinion toward more appropriate objectives for the schools, or should they do both?

Do board members, school officials, etc., hold views of education which are appropriate to the optimal development of the system as a whole? What kinds of human and other resources are needed to operationalize any or all of these models which seem to be appropriate within a school system? How might conflicting objectives be resolved in such a way that needs are met in some rational manner?

All of these questions and many others may be open to exploration by using the SCHOOLS opinion survey. These data are easily and quickly collected, but a computer program is required to score the questionnaire if large numbers of the opinionnaires are collected.

It is hoped that this instrument continues to sustain its initial promise as a useful tool for the exploration of education problems. Inquiries concerning research use of the instrument are welcome.

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BOOK REVIEW

TEACHING ELEMENTARY SCHOOL MATHEMATICS THROUGH MOTOR LEARNING. *By Robert B. Ashlock and James H. Humphrey.* Springfield, Ill.: Charles C. Thomas Publishers, 1976.

With current trends and emphases in elementary school mathematics focusing on active learning procedures involving use of concrete aids and games, a book that explicitly dwells on motor learning is timely if not overdue. Although there have been many book-length publications dealing with activity learning in mathematics (e.g., Biggs & MacLean, 1969; Kidd, Myers & Cilley, 1970; Dumas, 1971; Reys & Post, 1973; Schall, 1976), none have focused on the motor learning component involved. Thus it was with considerable expectation that I began examining the text by Ashlock and Humphreys—I had hopes of finally reading some in-depth presentation of the physiological, perceptual, and cognitive bases for activity learning as related to mathematics. On this score, I was profoundly disappointed; the purpose of the authors was not to relate activity learning to motor skills, or to perceptual-motor integration, or to cognitive (information processing) abilities, but rather to help the teacher to “do” motor learning of mathematics in the classroom. Although there is a chapter on the nature of learning through motor activity (Chapter 2) and a chapter on the research on learning mathematics through motor learning (Chapter 4), very little insight or information is provided on understanding how and why motor learning of mathematics works.

Specifically, the book does not provide information on how motor learning activities provide for the integration of physical, physiological, perceptual, and cognitive processes. Without a conceptual model for this integration, the teacher is left with little basis for thinking about what she is doing.

In regard to the research basis of motor learning of mathematics, the authors devote a chapter to their own research and that done by their graduate students. Five of the studies involved comparisons of the treatment A versus treatment B type of research. Three of the studies resulted in NSD findings; one study obtained significant differences but involved motor learning versus no instruction, hardly a valid comparison; the last study obtained significant differences in favour of motor learning at “a moderately high level of probability.” Given these kinds of results, the authors very aptly conclude the chapter on research by stating

However, it is interesting to note that no study has shown a significant difference in favor of traditional procedures over the motor activity learning procedure. (p. 66)

Despite making the above statement, the authors go on to conclude that they have now provided “some objective data to support” the motor learning activity approach to mathematics. This conclusion is debatable to say the most. If the book doesn’t provide the conceptual basis for understanding motor learning of mathematics, and if the research cited does no more than suggest that the motor learning approach will do no worse than traditional approaches, what does the book provide? It does provide a useful and well presented set of motor learning activities that classroom teachers should find relevant. In addition to discussing general ways of providing mathematical experiences through motor activities, the authors devote four chapters to specific procedures under the headings:

1. Mathematics Motor Activity Stories
2. Learning about Number and Numeration Systems through Motor Activity
3. Learning about Operations of Arithmetic through Motor Activity
4. Learning about Other Areas of Mathematics through Motor Activity.

As well, they provide a listing of the activities by concept and by title. Enough detail is provided for each activity so that teachers interested in amplifying the motor activity aspect of their teaching could do so. Many of the activities are couched in the game format; thus the likelihood of student enjoyment of the activities appears to be high. Moreover, most of the activities are of the large muscle variety (involvement of the whole body as opposed to just hands). As such they would complement nicely the small muscle activities usually found in mathematics classrooms. Involvement of the whole body makes participation much more dynamic, forcing attitudinal and physical as well as cognitive processes to be fully functioning. Under such circumstances, it would be difficult for the student to behave as a spectator.

Conclusion

The book does little to enhance current understanding of motor learning as a means for providing effective learning of mathematics. It does, however, provide a handy source of motor learning activities that show promise for learning mathematics.

D. Sawada
Dept. of Elementary Education
The University of Alberta.

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1. All manuscripts must be typewritten, double spaced, and submitted in duplicate. An abstract of approximately 100 words in length, typed on a separate page, should be provided.
2. Tables must be numbered in Arabic numerals with the word 'Table' centred and in capital letters, e.g., TABLE 4. The heading of the table is to be centred below and typed in capitals. The format of tables should conform to the specifications in the APA Publications Manual.
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